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NUMBER 2

JULY, 1948

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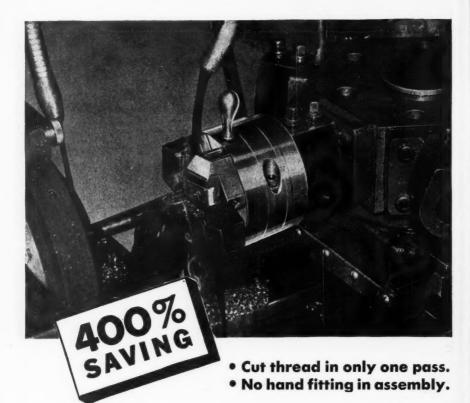
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 Time Study and Methods Department records of a large aviation equipment company furnish data of another job where LANDMATIC Heads have effected large savings in machine time and improvements in product quality.

In this operation, the 11/4" LANDMATIC Head on a turret lathe equipped with Lead Screw Attachment is cutting a 5/8-6 Acme thread on a Stabilizer Screw used by a light aircraft manufacturer. The thread was held to the close tolerance of ± .001 between the

P.D. of the thread and the O.D. of the screw, for a full thread length of 5¾" on cold-drawn piston stock, Spec. No. AISI, BIII2.

The thread is now cut in one pass in .192 minutes with a spindle speed of 230 R.P.M., giving an average of 400 pieces per chaser grind. This is a saving of approximately 400%. Former methods required two passes — one roughing and one finishing cut — and hand fitting with the mating nut was necessary in assembly.

Write for Bulletins F-80 and F-90

LANDIS MACHINE CO.

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SURFACE GRINDE

Furnishes more rigid support, smoother finish larger capacity

HERE'S a completely new Rotary Surface Grinder -the Heald Model 261 with exclusive "vertical column" design.

Wheel spindle is carried on a column, and chuck table rests directly on the ways of the base. A vertical slide carrying the wheel is mounted on anti-friction bearings. Results: rigidity . . . increased capacity . . . smoothest possible finish. Cuts are heavier . . . speeds and feeds more variable . . . setups quicker.

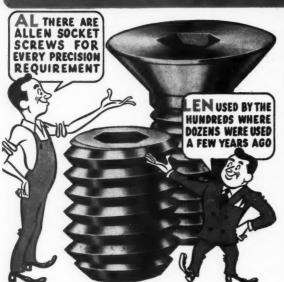
The new Model 261 follows the Heald principle of grinding with wheel periphery for a perfect concentric finish. Further research and development have added many other unique features. You can get complete details at one of the Heald branch offices maintained for your convenience.



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IF YOUR WORK INVOLVES ONE OF THESE FASTENING PROBLEMS



- ☐ Vibration
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- ☐ Tighter Gripping
- ☐ Serviceability
- □ Long Wear
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- ☐ Accessibility
- ☐ Fast Assembly
- ☐ Non-slip Driving
- Reduced Weight
- ☐ Better Balance
- ☐ Special Metals & Alloys

Look to ALLEN HEAD SCREWS for the answer . . .

Write us direct for the "Allen Story" on any of the important fastening problems listed above.

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Allen-TYPE screws aren't necessarily Allen-MADE. Be sure to get genuine ALLENS. SOLD ONLY THROUGH LEADING DISTRIBUTORS



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Where socket heads are not required for safety and convenience, Allen offers a high quality, super-strength square head screw in a broad range of standard sizes.



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and here's what BACKBONE gives you

The backbone, formed by the meeting

of the two helices without a useless center groove, puts the entire face width of the gear to work. This means extra strength and higher load-carrying capacity in smaller space. In addi-

Breater capacity for wear and shock tion, backbone provides resistance-especially important in heavy duty machine applications.

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Angeles, Tulsa, Houston.

Comparison of tooth area between conven-a Farrel gear with center groove.

Comparison of tooth area between

Farrel-Birmingham



ing holes . . . or deep holes . . . the solution may be in the use of a Hanson-Whitney spiral flute tap that is most effective when made by the Hanson-Whitney method, and with the Hanson-Whitney background of "ground after hardening" experience.

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HANSON-WHITNEY MACHINE CO. HARTFORD 1, CONN.
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GISHULL JURKET LATHES



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SPEED
CHANGES
at the
FLIP
of a
FINGER!

No manual gear shifting.

Just touch this knob for quick high-low or low-high spindle speed shifts.

A great timesaver—

Boosts Production!

Speed changes (6-1 ratio) are made by hydraulically operated clutches. This standard feature on all Gisholt Turret Lathes is a big advantage in drilling-tapping, boring-reaming, and turning-threading operations.

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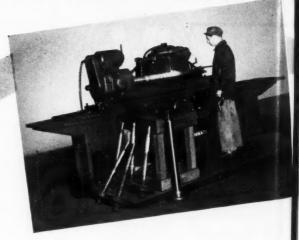
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represents the collective experience of specialists in machining, surfacefinishing and balancing of round and partly round parts Your problems are welcomed here.



YOU CAN QUICKLY CHANGE





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• How long does it take to get going on small lots? Whatever the answer is, setup time constitutes one of the major elements in the cost of small quantity precision toolroom grinding. Reduce setup time and costs go down fast. You can be sure of brief setups on CINCINNATI FILMATIC Hydraulic Universals, for they have many features of value in small quantity production. To mention only three: hinged type internal arinding attachment, always on the job: Filmatic spindle bearings, never require adjustment; lathe standard spindle nose on headstock. The photographs above show three toolroom setups which take advantage of CINCINNATI Hydraulic Universals' many features. Others have just as much value in reducing costs. All of them, plus complete specifications, are contained in these catalogs: 12" machine, G-486-4; 14", 16" and 18" machines, G-474-3. Send for copies.

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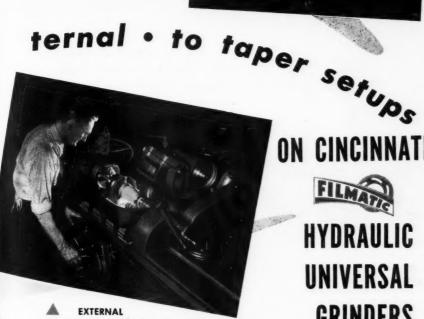
CINCINNATI FILMATIC 14" Hydraulic Universal with a variety of work ready to be ground.

INTERNAL

When an internal grinding job comes along, simply pull down the internal grinding attachment, lock in position and go ahead.



ternal



Grinding the taper, 31/2" per foot, on the shank end of an attachment drive gear. Notice that internal grinding attachment is up and out of the way. It does not interfere with straight or tapered external work.

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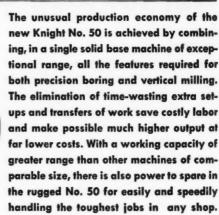


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CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES . CENTERLESS LAPPING MACHINES . CENTERLESS GRINDING MACHINES



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• 9 Spindle feed from .005" to .010"

• 100" per minute table traverse, both directions

• 16 Table feeds, 5/16" to 20" per minute

. 71/2 H. P. drive

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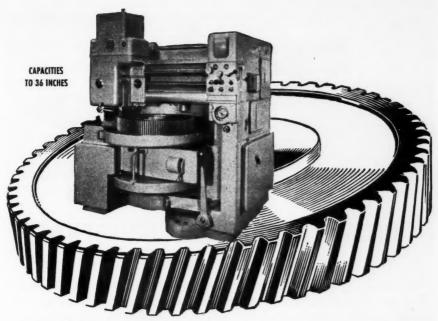
MORE GOODS for MORE PEOPLE at LOWER COST

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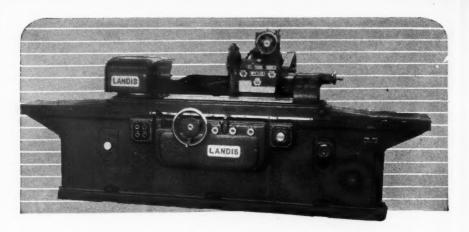
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LOW COST WET ABRASIVE CUTTING MACHINE

Wheel Guides * Separate Coolant Tank * Five Inch Wheel Flange

- Automatic Work Stop O Automatic Coolant Pump Operation
- Instantaneous Electro-Hydraulic Automatic Work Clamp

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CAMPBELL MACHINE DIVISION AMERICAN CHAIN & CABLE

MODEL 223

931 Connecticut Avenue, Bridgeport 2, Conn.

CAMPBELL **Abrasive Cutters** and Nibbling Machines

FOR HIGH PRODUCTION OF

SMALL DIAMETER HOLES

FOSDICK 4-BM and 5-BM SENSITIVE DRILLS

Here is a machine ideally suited to drilling and tapping operations up to 11/2" diameter holes.

Single speed motors with complete controls are furnished with the machine. To reverse spindle for tapping, an extra contactor is added to the controller. Operation is simple—forward movement of the hand wheel causes spindle to run in proper direction and reversing hand wheel causes spindle to reverse.

The drive to spindle is through Vee belts. All revolving shafts are mounted on antifriction bearings and gears slide on splined shafts.

The machines are furnished with box or round columns and in any number of spindles up to six.

This line of Fosdick drills offers exceptional economy in drilling — reaming — facing and tapping operations on work within its capacity. Write for complete details—fully covered in Fosdick H. S. Bulletin H. S. M.



FOSDICK

MACHINE TOOL CO. CINCINNATI 23, OHIO



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C. Van Arnem depends on a Jarvis overhead saddle-suspension type machine for a precision finish. Automotive Pattern Company, Detroit, Michigan.



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Tapping Attachments • Tecni-Taps and Dies • Rotary Files Flexible Shafts and Machines • Quick Change Chucks & Collets

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SMALL PARTS, TOOLS & DIES

In Your Own Plant

- Install anywhere by simple wire connection. Quiet in operation. No fumes or odors no ventilating required.
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- Operating cost under 4¢ per hour to hold 1600° F. in Model 3 furnaces, with 2¢ per kw.-hr. rate. Others in proportion.

NOW YOU CAN heat treat, harden and temper small parts in your own plant . . . without ex-perienced heat treaters. Economical to install and use, Cooley Electric Furnaces operate efficiently at high or low heats, and save your large furnace time for work requiring large volume capacity. Here are some profitable uses:

PRODUCTION HEAT TREATING of small parts . . . Small batches . . . Running pilot lots to predetermine mass production techniques . . . Emergency repairs . . . Industrial and laboratory testing . . . Miscellaneous controlled heating jobs.



CHAMBER	8"W 6"H 14"L	10"W 6"H 18"L	8"W 6"H 14"L 20000 F. 20.2 at 230 v. 4650	
MAX. TEMP.	18500 F.	18500 F.		
AMPERES	14.8 at 230 v.	19.6 at 230 v.		
WATTS	3400	4500		
MODEL*	MH-3 VH-3 MK-3 VK-3	MH-4 VH-4 MK-4 VK-4	VK-5 VK-6	
PRICE	200.00 230.00 250.00 280.00	295.00 325.00 345.00 375.00	420.00 340.00	

- * M models complete with hinged door and hearth plate. V models have counterweighted vertical lift door.
- K models include Selective Power Modifier for input control to correct temperature lag.

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Electronic operated Veri-tron indicating and controlling pyremeter, with thermocouple and lead wire... \$143.00 Same in self-contained, enclosed panel including line switch and fuses, with steel stand—completely wired...... 273.00 50.00

DEALERS AND DISTRIBUTORS WANTED!

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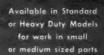
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INDIANAPOLIS MACHINERY EXPORT CORP.

Export Manager, 44 Whitehall Street, New York, New York

H-5 and H-6 High Speed Multi Drillers and Tappers





* In Cast Iron





In Steel



* In Plastica



Mydraulic Fe

ATCO H-5 and H-6 Standard and Heavy Duty Multiple Spindle Drillers and appers make possible sensitive, high speed drilling and tapping in a wide range I materials at low cost. Features are the multiple spindle head, are working working afface, quick change gears and speeds, vertical adjustment an spindles, and reversa mater drive. Available with hydraulic or hand and feat feed. Air exercised reary table evailable extra_Check details on these machines. Write for Bullerin 248.

RITE FOR ACTUAL PRODUCTION FIGURES ON THESE PARTS

NATCO DRILLING, BORING, TAPPING
AND FACING MACHINES



Call a Nator Field Engineer

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmand, Ind., U. S. A. Franch Offices. 1809 Engineering Bldg., Chicago. • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffalo. • 2902 Commerce Bldg., New York City...



A small Portelvator Pack Lifter in operation. Solenoid device keeps stack at constant level.

Safe and rapid machine feeding of heavy or bulky material depends upon convenient location and constant supply of stock • To meet this need, special adaptations of the patented Portelvator lifting principle are now being built and installed adjacent to the tool • According to special requirements, they may be designed in a wide variety of sizes, shapes, lift limits and capacities, and with buyers choice of control features and installation characteristics • Present users state that feeding time on machine operations has been reduced as much as 40%.

pounds.

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Six new Warner & Swasey Electro-Cycle Turret Lathes, with their instantaneous spindle action, gave this shop its opportunity—and bere's what happened:



Saving Money BILLET SHEARING

BUFFALO

BILLET

SHEARS

Above are a few of the ways "Buffalo"

Billet Shears are cut-

ting costs in shops today, in many cases

on punishing 24-hour

The "Buffalo" No. 17

Shears, at left, cut SIX 10" round billets

a minute - SIX 9" squares-SIX 28 x 4"

flats. Eleven standard

sizes. Write for Bul-

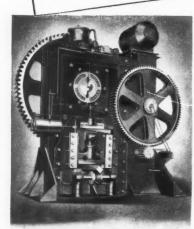
letin No. 3295-A. See

how you can cut

more billets-cleaner

shifts.

- In a steel mill Cutting hot slabs leaving finishing roll - Continuous production. Automotive plants - Shearing high tensile valve
- Forge plant Shearing square hard billets for • In a bar-mill-Shearing high tensile twisted bars.
- In a brass mill—Shearing rolled slabs and cast ... And many others!



ingots.

This No. 17 Buffalo Billet Shear stands nineteen feet high and weighs 175,000 lbs.



BUFFALO, N. Y. 388 BROADWAY Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



- * BACK SPOT FACERS
- * BAR CUTTERS
- * BENDING ROLLS
- * BILLET SHEARS
- * DOUBLE END **PUNCHES AND SHEARS**
- * LOCOMOTIVE SHEARS
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- * SPRUE CUTTERS
- * STRUCTURAL IRON WORKERS
- * UNIVERSAL IRON WORKERS
- * DRILLS FOR THE PRODUCTION LINE-DRILLS FOR THE TOOL ROOM

CONTINUOUS SERVICE—FASTER OPERATION—PEAK ACCURACY

and cheaper.

Precision stampings at Felt & Tarrant speed assembly of Comptometers

> tolerances of 0.0005" held on 65 holes

. . using **PRECISION**









produces 23,000 steel stampings per grind

Here is a Danly Precision Die Set employed by Felt & Tarrant Mfg. Co. of Chicago to produce frame plates for comptometers-high-speed adding-calculating machines.

The die illustrated is mounted on a four-post Danly Standard Semi-Steel Precision Set. It trims, pierces, and notches 65 holes in .035 cold rolled strip steel. The workpiece is hand fed and positioned on dowel pins. A two-post stripper is used to prevent distortion. Production averages 23,000 pieces between grinds. Typical of other stampings produced for comptometers with Danly Die Sets, tolerance of .0005" on each hole is maintained which speeds assembly line work and permits complete interchangeability of parts.

Here again is evidence of the inherent accuracy of Danly Precision Die Sets under actual press operating conditions. Built to precision tolerances (guide posts and bushings ground to limits of .0002") they permit taking full advantage of the die maker's precision, help you hold close tolerances and get longer tool life.

Danly has a wide range of standard stock sizes available

which can be quickly assembled and delivered to help you save time and money.

Danly Engineering Service

Consult our engineering department for helpful recommendations on die sets-large or small, standard or specialfor any type of press operation.

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Danly offices in 10 key cities give immediate attention to your orders.
Assembly plants (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to your specifications.

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* ASSEMBLY SERVICE

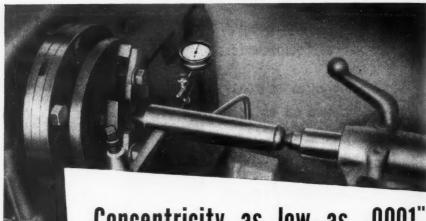


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DANLY MACHINE SPECIALTIES, INC.

2100 SOUTH SIND AVENUE, CHICAGO SO, ILLINOIS



in a matter of seconds! with CHAPIN AUTO - TRUER*

Holds universal chuck, independent chuck, face plate or special fixture. • Adaptable to most lathes.

Amozingly simple! Any lathe operator can master the CHAPIN AUTO-TRUER in just a few minutes.

Easy to install! The CHAPIN AUTO-TRUER is mounted on the lathe spindle—then the chuck, face plate or special fixture is mounted on the AUTO-TRUER.

Pays for itself! Cut your labor costs by saving time—on Tool Room or Production Lathe. Eliminate the waste motion and "cussing" of the conventional "trial-and-error-method" of centering the work.

Write for Detailed Description.

* It Trues Your Work Automatically

Patent Pending

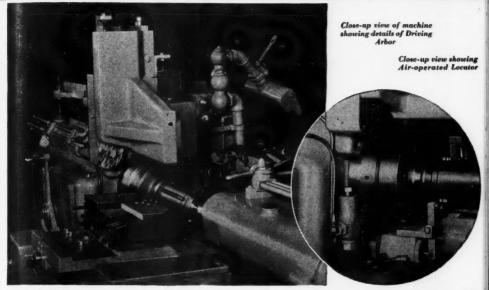
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Certain Territories open for Dealers.

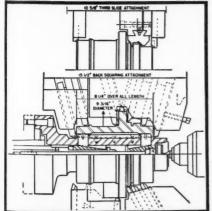
East Rutherford, N. J. • Established 1893

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENECA FALLS, NEW YORK



PRODUCTION SPEEDED ON DRIVE GEAR HUBS WITH MODEL "AR" AUTOMATIC So-swing LATHE



Problem: To automatically turn, face and chamfer shoulders, and cut groove on Gear Hub with 9" Flange diameter, locating and centering from bottom of spline previously machined.

Solution: The Model "AR" Automatic Lo-swing Lathe was selected for this job due to its rigid construction and its demonstrated fine performance with cemented carbide tools.

The expanding, air-operated driver, shown in the line drawing and the main illustration, is fitted with two sets of six driving jaws which accurately center the part true with the bottom of the splines. The jaws are actuated with two independently-expanding bushings and pull bars which equalize the pressure on both sets of jaws. The parts are located longitudinally on the arbor by an automatic, air-operated locator, which moves forward to the exact locating position when the tailstock spindle is withdrawn and relieves when the spindle is advanced.

All diameters are turned with the tooling mounted on the front carriage slide. The squaring, chamfering and grooving operations are divided between the rear and vertical slides in order to simplify the tooling which is used for several different sizes of hubs. The line drawing shows the tooling in detail.

Consult our Engineering Department for Automatic Lo-swing Lathes engineered for your particular turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

MORE COMPLETED PARTS . . . AT LOWER COSTS . . . IN LESS TIME .

WITH

MORRIS MOR-SPEED PRODUCTION MACHINE

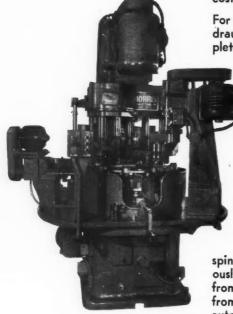
Each Morris high production machine is designed for the job. The result is more completed parts—in less time—at lower costs.

For example, the 10 station Vertical Hydraulic Automatic machine shown completes four operations—drilling—boring

— reaming—chamfering—tapping — on an automobile Oil Pump Housing and turns out a finished piece at each index of the machine. The operator merely loads and unloads the work by means of a hand clamp arrangement which operates the ten hand clamp fixtures.

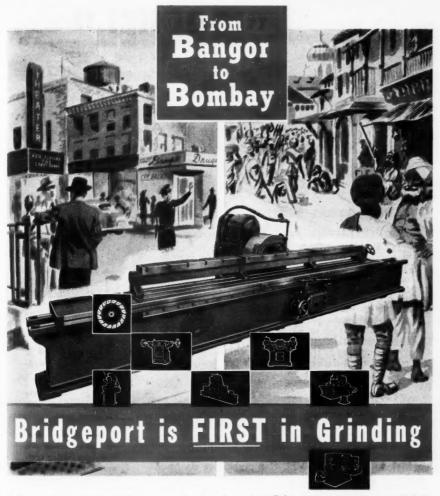
The machine is equipped with twelve vertical drilling and boring spindles, two vertical reaming spindles, four vertical tap spindles and one horizontal drill

spindle all of which operate simultaneously on a work piece as it is indexed from one position to another. Aside from hand clamping all operations are automatic and operator merely presses a button at the start of each cycle.





24



Wherever there's grinding, buffing or cut-off work to be done, Bridgeport machines mean more profitable production. In many parts of the world there are Bridgeports as rugged after a quarter-century or more service as the day they were made. Today's models are built to give the same brand of service . . and are engineered for far greater efficiency in applications as new as day after tomorrow.

To help you get the right wheel as well as the right machine for your work, complete engineering service . . . from abrasive specialists as well as equipment experts . . is available from Bridgeport. And it's yours not merely for the guarantee period of a machine but for as long as you can use it to good advantage. For "johnny on the spot" help with any grinding problem, ask Bridgeport First.

Just off the press . . New descriptive Bulletin 2700 on Hydraulic Face Grinders. Write for it.



Horizontal Face Grinders, Vertical Grinders, Cutlery Grinders, Buffing Lathes, Knife Grinders, Floor Grinders, Abrasive Cut-off Machines, BuXite Abrasive Wheels.

BRIDGEPORT SAFETY EMERY WHEEL CO. 1305 West Broad Street, Stratford, Conn.



The High-Speed-Edge does the cutting while the alloy back with hardened eyes, carries the load. Blade tensions up to 300% higher than those possible with ordinary blades are recommended. This greater tension is confined to the cutting or leading edge by the location of pin holes (exclusive MAR-VEL design feature) and cannot be overcome by work resistance. Heavier feeds and greater speeds are practical without "run out."

With greater accuracy, higher production and lower cost per cut, come the extra dividend of Safety, for MARVEL High-Speed-Edge Hack Saw Blades are Positively Unbreakable—they will not shatter.

Ask your local MARVEL distributor (see classified phone book) to help you modernize your metal sawing with MARVEL High-Speed-Edge Blades. They cost no more than ordinary high speed steel blades.

- 1. Genuine 18% Tungsten High-Speed-Steel cutting edge.
- 2. Tough unbreakable alloy steel body with hardened eyes.
- 8.2. Integrally welded to make a fast-cutting, long lasting composite blade that is positively unbreakable.

ARMSTRONG-BLUM MFG. COMPANY

"The Hack Saw People"

5700 BLOOMINGDALE AVENUE

CHICAGO 39, ILLINOIS



avey's
PLUS
features

add up to TOP PRODUCTION



Selective, sliding gears of AVEY BMA-6 change speeds quickly and easily. Each gear is manufactured and finished by accurate, modern process, shaved, hardened and lapped. Insures smooth operation and long performance.

AVEY TYPE BMA-6

Four Spindle-12" Overhang

1st spindle—Avey-matic feed
2nd spindle—Plain powe: feed

3rd spindle—Hand Feed

4th spindle—Tapping (reversing motor)

CAPACITY Cast-Iron

No. 28MA6-74" No. 38MA6-11/4"

Single to six spindle machines, equipped with hand feed, power feed or reversing motor tapping.



plus FINAL SPINDLE DRIVE - VEE BELTS

SIX SPEED CHANGES

operation.

Vee belt used on final drive from gear box to spindle. Increases speed and sensitivity in drilling. Carries full horse power from motor to job.

STANDARD MOTOR - EACH SPINDLE

Each spindle of AVEY BMA-6 individually motor-driven by standard frame constant speed motor. Foot-mounted motor easily interchanged or replaced. Standard motors can be stocked.

On the AVEY BMA-6 six speed changes are made

through selective, sliding gears. This automotive type of gear shift is controlled by a single lover at front of machine. Provides versatility and effective



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SECOND

REAR VIEW OF GREENLES SECOND OPERATION MACHINE



ON GREENLEE SIX-SPINDLE AUTOMATICS



CLOSE-UP OF WORKING AREA

Standard Greenlee Six-Spindle Automatic Screw Machines can be adapted for second operation work, as illustrated above. A typical production piece is shown at the right. Automatic feeding attachments can be furnished for cylindrical pieces (though in this instance hand-feeding was used, with an air-operated loading spindle). Machining operations are performed simultaneously at all positions by both end-working and cross-slide tools in a continuous automatic cycle. Finished pieces are ejected automatically. The machine shown here, which was a center of attraction at the 1947 Machine Tool Show, also included the new Greenlee Lead Screw Feed for better precision threading.



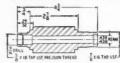
Write today for literature describing features and giving details of the GREENLEE "SIX" - the Operator's Favorite.



OF WORK







Spindle Position	OPERATIONS
2	Load and Unload
3	Drill %" hale 2%" deep for 5%" tap. Chamfer end O.D.
4	Counterbore and bottom the same hole. Face end.
, 5	Tap %"-18 right-hand precision thread. (Lead Screw Feed Attachment).
6	Ream .438" diameter hole.
1	Chamfer inside thread.

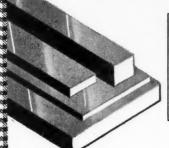
PRODUCTION TIME: 15 SECS.

GREENLEE BROS. & CO. 1887 MASON AVE. ROCKFORD, ILLINOIS

MULTIPLE-SPINOLE DRILLING, BORING, TAPPING MACHINES . AUTOMATIC SCREW MACHINES . AUTOMATIC TRANSFER PROCESSING MACHINES

Immediate Delivery!!

ALL STANDARD SIZES FROM STOCK



Precision-Master

GROUND FLAT STOCK

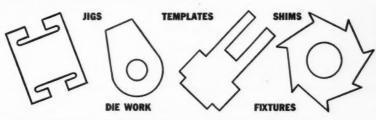
USAGE — Saves time and insures accuracy in making TEMPLATES, JIGS, GAUGES, MACHINE PARTS, SHIMS, FIXTURES, TOOLS, and DIE WORK. More economical for toolmakers to use as expensive machining and grinding operations necessary to bring mill stock to accurate measurements are eliminated.

PRECISION GROUND — Thickness within plus or minus .001" of specification, accurately squared on edges and ends. Smooth Finish.

STANDARD SIZES — 18" pieces 1/64" to 1" thickness in various widths. Individually packed in grease proof envelopes. Special sizes on application.

HEAT TREATMENT — Instructions on envelope. Can be either Hardened by Oil or Water Method.

DELIVERY - Prompt delivery from stock.



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The Van Keuren Gear Measuring System is generally accepted as the easiest and most accurate method of checking footh thickness of gears, 30° involute splines and 90° involute serrations. A measurement is made over two opposing wire and this actual measurement is compared with the theoretical measurement over wires for a perfect gear as computed from the Van Keuren tables for 1 diametral pitch gears.

The only equipment required is a set of 2 wires of the proper size for each diametral pitch.

Standard sizes of wires available from stock are:-

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DP for external spurs and helicals

DP 1.44"

for internal spurs and splines

DP
1.92" for enlarged pinions, 30° involute splines and 90°
involute serrations.

DP 1.68"

DP Alternate series for special requirements.

SIMPLE • • For spur gears, involute splines and serrations, the only calculation is one of simple division. For helical gears use the simplified computation forms VK-103, VK-104 or VK-105.

RELIABLE... The 1.728"/DP System is used by over 90% of American gear producers and users. The 1.44"/DP and 1.92"/DP systems have been incorporated in standards for involute splines and sertations.

ACCURATE • • • The Van Keuren Gear Tables are complete for gears from 5 to 500 teeth and for pressure angles of $14 \frac{1}{2}^{\circ}$, $17 \frac{1}{2}^{\circ}$, 20° , 25° and 30° . If the measurement over the wires is greater than the value calculated from the tables, the

tooth is too thick and the cutter must be fed further into the gear blank. Constants for controlling tooth thickness and backlash to .0001" are given for all pressure angles.

The New 1948 Catalog and Handbook No. 34 is a 208 page volume, which has been in preparation for nearly two years. It contains new and epoch making formulas and tables for the exact measurement of screws and worms and complete tables and formulas for using the Van Keuren gear measuring system.

Price \$1.00 Postpoid
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Set No. 26 EX. External Gear Measuring Wires, \$140.00.

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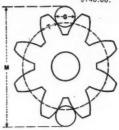
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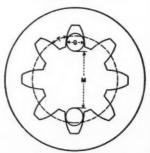
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EXTERNAL SPUR GEAR



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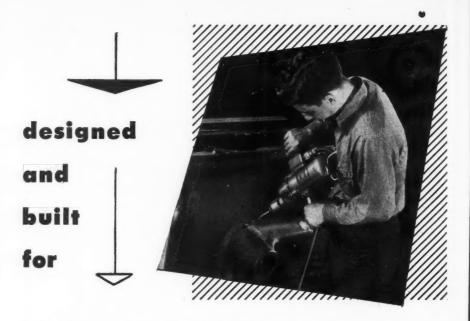


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THE PRODUCTION LINE

In the hard, continuous service of the production line, CP Universal Electric Tools are recognized as outstanding for dependability and low maintenance costs.

CP Universal Electric Drills, in sixty types and sizes, range from the Midget, for close quarter \(^{1}/_{4}\)" production drilling, to the powerful CP-985—1" in metal or 2" in wood.

CP Universal Electric Screw Driv-

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Other time-saving CP Universal Electric Tools include Grinders, Nut Runners, Reamers, Tappers, Sanders, Buffers, Flue Rollers, Hammer Drills, Scalers, Files. Write for a copy of Catalog No. 899.



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This solid, continuous cut in cast-iron, straight across a flat surface, is an ideal operation for Be-C Carbide-Tipped Shell End Mills. Cutting Teeth, constantly engaged in the cut, need diamond-hard, sharp cutting edges to keep pace with production requirements. Constant contact with the material and the abrasive action formerly made frequent sharpening necessary with High Speed Cutters.

With B-C Carbide Shell End Mills, now used on the job, tool life is increased from 30 to 200 pieces per cutter sharpening, and production is increased 2 to 3 times over what was formerly obtained with HSS cutters.

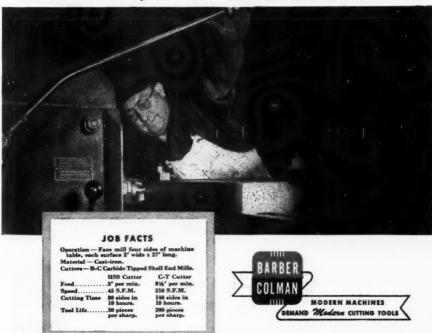
Perhaps there are ideal conditions for carbide milling operations in your production lines. Carbide cutters cannot be expected to show



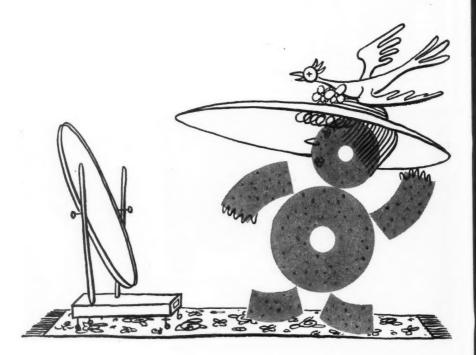
improved results on all milling jobs, but under certain conditions they show definitely superior production advantages. Why not send us specifications on one of your jobs, and let us recommend and quote the proper carbide cutters for your consideration. Call your nearest Barber-Colman representative today.

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Costing too much to dress your wheels?





... better use ROBERTSON!

The conventional wheel, which rapidly becomes loaded and constantly has to be dressed, is expensive. It wears out faster, and the time spent dressing it represents additional cost, cuts production.

You don't have to baby Robertson Grinding Wheels. They resist loading, because their revolutionary "open" structure allows plenty of space for chip clearance. And the results they achieve are outstanding. Take this instance:

A Landis Plain Cylindrical Grinding Machine was turning out only 60 pieces per wheel dressing, using a straight plunge cut with a conventional wheel to remove .015" to .020" stock from 1020 steel bushings, hardened and carbonized to Rockwell C 53-55. When a Robertson sales-engineer was called in, he recommended our RA 464-MV wheel. On the same job, under the same conditions, production was increased to 220 pieces per dressing—nearly four times as many!

The plant superintendent watched this performance with amazement. "That's a good wheel," he said. "I don't believe it will ever wear out."

Specify Robertson vitrified-bonded or resin-bonded wheels for cool cutting, even on the hardest metals—for accurate, fast production—and for lowered grinding costs. For unusual jobs, blueprint your problem, and let us recommend a wheel for your particular job.

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An Important Announcement From The FORD MOTOR COMPANY

Since 1923, we have manufactured and distributed the world-famous Johansson Blocks.

We now have completed negotiations for the sale of the Johansson Gage Division of the Ford Motor Company to Brown & Sharpe Manufacturing Company of Providence, R. I. Before this transaction was completed, we gave very careful consideration to the problem of finding a company with the skill and experience that would assure continued production of Johansson Blocks to the Johansson standards of quality.

The Brown & Sharpe Manufacturing Company has 115 years of experience in the making of precision tools, and after careful study, we decided that this experience, coupled with their standing in American industry, made them the sound choice to take over the manufacture of these precision gages.

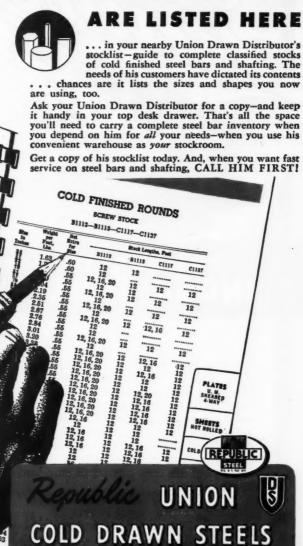
All patents, methods and machines required for making Johansson Blocks become the property of Brown & Sharpe. Machinery and special steel stocks are being moved to Providence.

Meantime we will continue to provide Johansson Blocks from available finished stock here at Ford until Brown & Sharpe are in operation and ready to supply them.



FORD MOTOR COMPANY

THE Steel BARL YOU NEED



FINISHED ROUNDS

B1113

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SCREW STOCK

-81113-C1117-C1137



PRODUCTION INDEX TABLES

The Buhr Power Index Tables are fast, shockless and accurate for indexing with lowered operator fatigue. The tables are adaptable to horizontal and vertical applications.

The same high standards which have made Buhr Multiple Drilling and Tapping Equipment known throughout the metal working field, have been incorporated in the Buhr Index Tables. They were originally designed as components of Buhr Multiple Drilling Machines but are now offered as standard units to all industry.

> ALSO AVAILABLE IN HAND AND GEAR OPERATED MODELS

TOOL COMPANY ANN ARBOR, MICHIGAN

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FOR ALL TYPES OF INDUSTRY

Throughout the metal working field there are many parts that can be successfully surface broached—faster, more accurately and at less tool maintenance cost than possible with present methods. We will be glad to work with you on the application of Footburt surface broaching machines on your work. Just write.

THE FOOTE-BURT COMPANY

Cleveland 8, Ohio
Detroit Office: General Motors Building





If you're looking for a fast way to drill small parts, it will pay to investigate Atlas Drill Presses. Atlas speed, ruggedness, accuracy, and all-round dependability team up efficiently with special fixtures for profitable production drilling.

For example, General Gas Light Co. of Kalamazoo, Mich., uses an Atlas No. 63 Drill Press with automatic feeding device to drill 4 holes in brass valves at the rate of 9 pieces a minute — 2160 holes per hour!

A cam in the feed mechanism, designed by General, drives a rack which operates a pinion connected to the drill press feed spindle. In production, the operator simply positions the work — the Atlas and the automatic feed do all the rest. In another drilling operation, an Atlas with the same type automatic feed drills a 3/8" hole, 11/4" deep, in brass at the rate of 660 per hour.

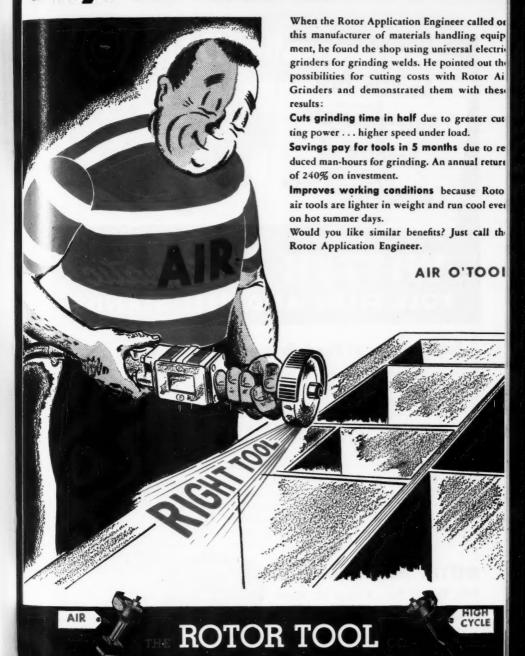
There may be dozens of such profitable uses for Atlas drill presses in your production. Send for a catalog today.



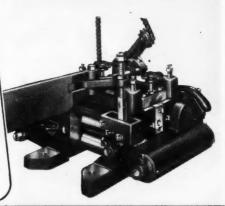
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Wittek Adjustable Reel Stands provide automatically expanding coil holders that center the coil and assure maximum production by eliminating looping, tangling and back lash of stock. If your production problem involves feeding coiled stock to punch presses, consult us. Your inquiry will be given immediate attention. Ask for completely descriptive catalog.

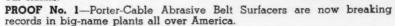
WITTEK Manufacturing Co. 4305 W. 24th Place, Chicago 23, Illinois Automatic ROLL FEEDS REEL STANDS

NEW MACHINING METHOD

is 3 to 10 Times Faster!

★ FIND OUT how it will Slash Hours from Your Production Time.

Here's an offer you can't afford to miss... and we don't ask you to invest one dime until we prove our claims.



PROOF No. 2—Read our case records showing increase in production when shops switched one or more operations to Porter-Cable Abrasive Belt Machines. In many instances, **production increased at least 300%**.

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The Motch and Merryweather "DE" (double end) Transfer Machine has no equivalent. Standard bar stock is automatically fed, cut off with a square milled finish, to accurate lengths of ±.004"; then automatically transferred to equalizing, self-centering jaws for accurate double-end machining. You save at least one operator; save several handlings; save overhead and floor space; save tooling. Husky construction makes for trouble-free service and long, profitable life.

Rugged secondary heads with simple gear reduction to husky spindle. Positioning slide adjusted quickly by rack and pinion. Hydraulic feeds and variable speeds.

Get the facts about this remarkable new but thoroughly proven machine



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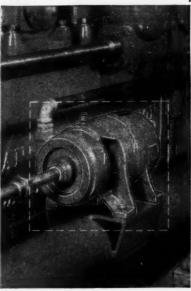


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Illustrated is Model AG6M mounted on heat exchanger in tube mill manufactured by American Electric Fusion Corporation, Chicago . . . numerous models available suitable for YOUR plant, too.



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IN ONE OPERATION

money saver.

BRIGHTBOY INDUSTRIAL DIVISION WELDON ROBERTS RUBBER CO.

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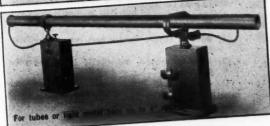
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- Safe and fool-proof. Eliminates feed fingers, feed finger tube, and all other parts related to feeding in the screw machine.

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Increased Production plus Greater Safety

— at No Added Cost

PRESS-RITE OPEN BACK INCLINABLE PUNCH PRESSES

- Greater Safety for the OPERATOR
- Greater Safety for the DIES
- Greater Safety for the PRESS

No greater combination of features has ever been offered in any punch press that will provide such great safety to the operator . . . dies . . . and press. And the improved 1948 PRESS-RITE PRESS line offers this greater safety without added cost and includes such outstanding advantages as:

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PRESS-RITE No. 12 12 Ton Press

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Which Drill will produce more?

You can't judge a drill by its looks—they't alike. Only by actual use differences in production



Which CARBIDE will produce more?

All standard carbide blanks and tools look alike. Only by running on your own machines can you discover the greater productive capacity of Improved TECO Cemented Carbide.



Production reports show 3 to 10 times more pieces

OPPORTUNITY FOR TOOL MANU-FACTURERS to cash in on fastgrowing demand for TECO Comented Carbide. Write us for full details.

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Tool up any carbide job with Improved TECO in place of your present carbide. Prove to yourself that it stays on the job much longer—removes more metal—produces more pieces—operates at higher speeds and feeds—gives a better finish.

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give SHELDON LATHES GREATER ACCURACY—

Because the spindle of the SHELDON TRB-S56 is mounted on Timken Zero Precision Bearings, extreme accuracy, higher machining speeds and lower production costs are insured.

Timken Zero Precision Bearings are by far the most accurate tapered roller bearings that can be made in regular commercial production. Runout or eccentricity is restricted to less than .00015 of an inch. Cups and cones of Timken Zero Precision Bearings are matched and shipped as a complete unit.

Due to the line contact between the rolls and races, the spindle is firmly supported—no chance of deflection. Because of the tapered con-struction and provision for take-up in assembly, there is no possibility of end-movement.

Zero Precision Bearings are Timken's very finest, the ultimate result of



Zero Precision Bearings

Manufacturers of Sheldon Precision Lathes . Milling Machines . Shapers 4250 N. KNOX AVENUE . CHICAGO 41. ILLINOIS. U. S. A.

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Twist drills sharpened on the Oliver require less feeding pressure and horsepower to operate. They are accurate, and produce uniform holes . . . they require less frequent sharpening, which means longer tool life and less machine "down" time.

Savings soon pay the initial cost of the machine.



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Regardless of the size, kind or shape of your stock, the great cutting capacity and precision work of these machines help you lower the cost of your product. Accurately cut blanks require less subsequent machine work. Fully automatic operation relieves your operators for other jobs.

Full hydraulic operation and control permits extremely simple but heavy, rugged design. This insures a low operating costit is the main reason Racine equipment is



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Variable Volume, 12 - 20 - 30 g.p.m. Pressures to 1000 p.s.i. 4-way and other control valves 3/8" to 11/2". Data on request.

RACINE

STANDARD FOR QUALITY AND PRECISION

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Automatically inject clean oil into the airstream, creating an oil-air fog which travels with the air. This coats all moving parts of the tool or cylinder with protective film of oil.

Works only when the tool runs. Protects all the time against

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Eliminate fumbling and guessing when gaging Holes, Slots, Finding Centers, Locations, Etc. Horberg Drill Size Pin Gages are accurate to +.0001 —.0000.





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· Overall Length 11/2" · Lower Half Concentric Tapered for Easy Insertion and Alignment for Holes down to .0012 smaller • Oil Hardened Tool Steel. No other pin gage has such accuracy at so low a cost.

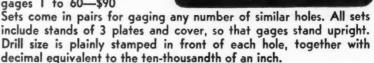
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LETTER SETS: 52 gages from A to Z-\$45 FRACTION SETS: 60

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NUMBER SETS: 120

gages I to 60-\$90



Prices F.O.B. Bridgeport, Conn. Immediate Delivery.

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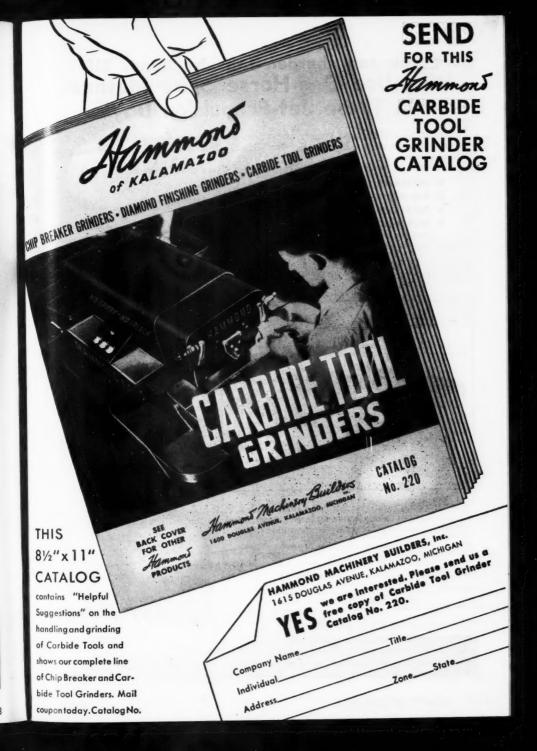
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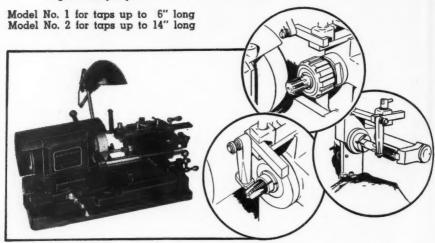


Why Use One-Horse Shay Methods In These Jet-Propulsion Days

The modern shop requires speedy as well as accurate tap sharpening—the kind that anyone can do on the BLAKE: the Tap Grinder that makes everyone a fast expert tap sharpener.

Our surveys of hundreds of Blake Tap Grinder Users show these results:

- 1. INCREASED TAP LIFE of 100 to 1,200%.
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Sharpens both right and left hand taps—with 2, 3, 4, 5, 6, 8 or 10 flutes. Also economically sharpens many other tools requiring relief on the cutting edges. Get the full details by sending the handy coupon today.

Please send me con The Blake Tap Grin		M.M.S.	EDWAR		
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Contract to the contract of th	CISION DRILL GRINDE E FLUTE GRINDERS • HREAD MILLERS • AME				VTON CENTRE 59, MASS.





This iron casting has 288 chilled lump interruptions. A Kennametal standard Style 11780 tool faces and turns it at 190 ft./min., .048" feed, and ½" depth of cut.



Kennametal bares, turns, and faces over interruptions and sand holes on this chrome-nickel steel rack pinion. Speed—155 ft,/min.; feed—0.32", depth of cut—1½" to 5/16" Performance is 5 to 1 over high speed steel tools in production and pieces per grind.

You're probably enjoying the advantages of carbide tooling on continuous-cut operations—but how about interrupted cutting?

Has this given you tool trouble, and made you resort to slower machining methods on some important jobs?

If so, Kennametal will help you solve this problem. Its ability to withstand the shock of interrupted cuts, on both cast iron and steel, has been unequalled.*

Although cutting conditions are often improved by changing the tool shape so that the shock will be imposed on a section of the tip that is stronger and better supported, it is still the carbide that must take the punishment. Here's where Kennametal has a distinct advantage.

where Kennametal has a distinct advantage.

Because of exclusive processing methods and careful control in manufacture Kennametal's impact strength is unusually high for such a hard material—as great as that of hardened alloy steels having much lower hardness and compressive strength.

Still further advantages for interrupted cutting are obtained by the use of mechanically-held tools developed by Kennametal Inc. Tips of characteristically high impact strength are securely clamped to, and firmly supported by a heat-treated steel shank, to provide an exceptionally strong strain-free assembly.

If you have had difficulty with carbide tools on interrupted cuts, let us engineer Kennametal to the solution of your particular problem.

> *Ask us to send you a set of Performance Reports that demonstrate the superior results obtained with Kennametal Tools on interrupted cutting.



MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTION

Thorough-Bred **FILES**

that come from BEST STOCK



No matter how carefully any tool the longest possible service. may be processed, its life is predetermined by the quality of metal from which it is made. "American Swiss" selects only the finest quality file steel-not ordinary tool steel - for its Swiss - Pattern Files, to assure its products the "right start in life" . . . and to assure their users

Here you see a small part of the fine file steel stock of which "American Swiss" Files are made-one of the many reasons why users report that these precision tools last 25% to 50% longer than most Swiss-Pattern Files.

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WITH

RUTHMANGUSHER

COOLANT PUMPS



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American Broach & Machine Co.

For improved efficiency in your metal cutting operations specify Ruthman Gusher Coolant Pumps.

Oversized pre-lubricated bearings reduce maintenance cost. Electronically balanced rotating parts assure quiet operation and longer life. Split-second control of coolants, from a trickle to full volume, gives coolant flow where you want it when you want it.

Illustrated is an American VP-5-25-40 Broaching Machine equipped with a Model 11022-C $^{1/2}$ HP Gusher Coolant Pump.

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Cincinnati 2, Ohio



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This bull pinion, a part used on Cincinnati "Hypro" Planers, is a 4145 forging, having two 6" long bores, in line, 4\frac{4}{4}" in diameter. The bores were formerly reamed, removing .005" of metal, with tolerance of .001" in 10 minutes. Surface finish equalled 100 micro-inches. By changing from reaming to honing on a Fulmer Honing Machine, only one minute is required to remove .005" of metal to a tolerance of .0002"—and a surface finish of 10 micro-inches is obtained.

This one example is typical of the savings in production time and labor, and the improvement in piece quality that is made possible by Fulmer Honing Machines. If your production involves precision processing of cylindrical bores ranging from ½" to 30" I. D., investigate Fulmer Machines. Write today, describing your specific work requirements, for complete data on Fulmer Honing Machines adaptable to your production. There is no obligation.

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★ Honing Machines • Rod Borers • Piston Ring Lappers

he flunked his test!



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Every type and size of Putnam End Mill is listed in the Putnam Catalog. Write on your letterhead for your copy.



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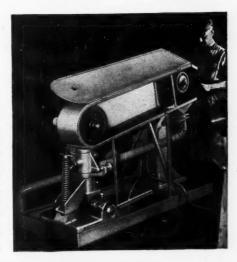
Mattison ABRASIVE-BELT BACKSTAND IDLER



THE REGULAR GRINDING AND POLISHING LATHE

THE USE OF FACTORY-COATED ABRASIVE BELTS

Many manufacturers have definitely determined the greater efficiency and economy of using abrasive belts over set up wheels. There are fewer rejections due to mild scratches, uniform results, less chance of burning or discoloring, lower polishing cost per piece, as a result of increased production. THE MATTISON ABRASIVE BELT BACK-STAND IDLER enables you to take advantage of this method at a very small investment. You use your present lathe and set the Backstand Idler in the rear. For complete information send for our new free circular giving complete details.





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NEW, VERSATILE 25 TON MULTIPRESS



IT'S THE PRESS YOU DEMANDED WE BUILD!

SPECIFICATIONS

Tonnage Can	•	-	~	"	OV	IS	
Stroke		٠				25	tone
Daylight							150
inrogt Donal		-					2511
Approach c						1	12/1
ressing Sm.			4.		. 4	50 :	-
nerurn Span					21	0 :.	
Return Speed Height 95", Wid	Ith	2	2#		40	O ip	m
		3,	-	D	epth	54	"

ADAPTABILITY—The new 25-ton capacity Multipress has been designed for operations requiring the flexibility of control featured in the smaller models of the Multipress, plus the added advantage of higher tonnages.

CONTROL—Furnished in either manual or automatic types with regulation for

ram approach speed, stroke length, pressing speed and tonnage.

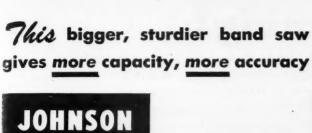
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HIGH SPEED—Although approach speeds are faster than the standard 4-ton Multipress, pressing speed may be regulated for slow controlled operation. Write for details.



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 Automatic, hydraulic feed, quick adjustable from front of machine.

IOHNSON

 Quick-setting vise, operated from front of machine.

· Stop for setting work, duplicating length cut-off.

• Four motor speeds. Automatic shut-off at end of cut.

Made in two types—dry cutting for general work, wet cutting (lilustrated) for high production. Both models moderately

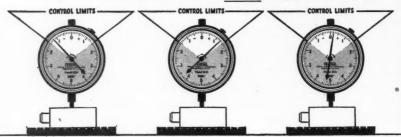
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JOHNSON MANUFACTURING CORP.

Warning!

It's time for new eyes in your production line—
to make the work come through right the first time
—to let your workers see what they're making
—to adjust machines before they produce scrap.



I'm about to produce under-size pieces!

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Dial Indicator Gages tell the mechanic what he wants to know. They show him whether the part is too large or too small; they also show him exactly how much the workpiece is off standard. He gets an accurate reading at a glance; he saves time; he no longer relies on the sense of "feel".

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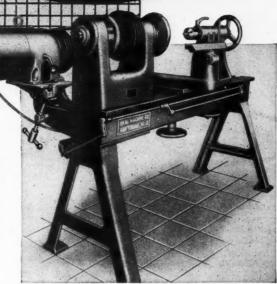
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182 FINDLAY ROAD

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MODERN MACHINE SHOP



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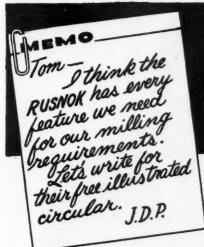
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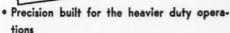
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Sizes from 2½" x ½6" to 8" x ¾6"

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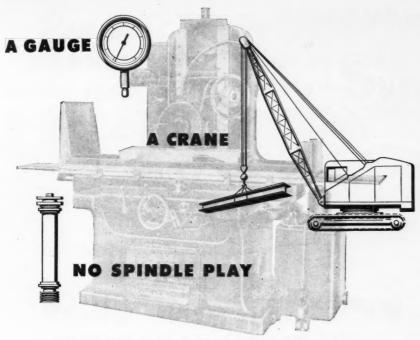
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For complete details and specifications on these and other Circular Saws, send for our Catalog ${\bf L}.$

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*Accuracy within 0.00025 limits.

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THE JOB: An order of 10 pieces 12% x 8½ x .078
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TOTAL TIME FOR 10 PIECES:

OLD METHOD: 9 hours, 16 minutes
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(Time includes loading and unloading
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TIME FOR 1st PIECE . . . 19 minutes, 18 seconds

TIME FOR EACH OF NEXT 9 PIECES . . 6 minutes, 39 seconds

The job was produced on a Wiedemann R-4P 11 Station Turret Punch Press with Drop-latch gauge. Layout work was done directly in the machine and is included in the above time.

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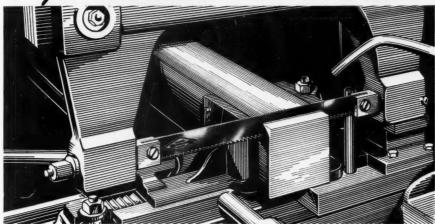




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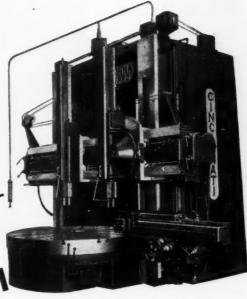
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FINE INCREMENT SPEED CONTROL— Multi-point, fine increment motor rheostat controlled from operators position, eliminates compromise speed settings, inevitable with conventional gear changes. Exact cutting speed assures maximum production.

TAILORED TABLE SPEEDS—On work of varying diameter table speed may be continuously adjusted for maximum production, without stopping table, without shifting gears and while tools are cutting.

SET UP TIME REDUCED—Fine increment table inching control in forward and reverse directions with dynamic braking.

OPERATOR'S FATIGUE ELIMINATED — Complete control of all motors from single accessible pendant station, plus absence of table clutch and brake shifting lessens operator's fatigue.



Effortless Control
COMES WITH
CINCINNATI
HYPRO
SPEED CONTROL

CAN NOW BE FURNISHED ON ALL HYPRO BORING MILLS IN FOLLOWING SIZES:

> 54"—64"—6'—7'. 7' widened to 8'. 8'—10'—12' 12'—16' Extension type.

THE CINCINNATI HYPRO PLANER COMPANY
PLANERS - BORING MILLS - PLANER TYPE MILLERS

CINCINNATI, OHIO

FAMOUS MANUFACTURER SAYS ...



Aiding in the program to rebuild European railroads, a famous manufacturer turns out thousands of angle cock bodies for air brake equipment, using a battery of Lodge & Shipley ACME Turret Lathes. Turning, facing and threading operations are done at a high rate, obtaining output and accuracy which are "very satisfactory."

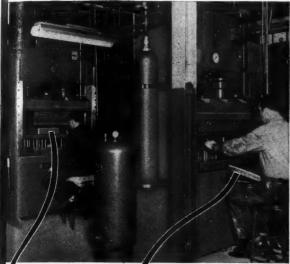
Lodge & Shipley ACME Turret Lathe owners consistently praise the operating ease and simplicity of these fine lathes, cite production records to prove the point. Investigate the profit possibilities of ACME Turret Lathes. Call in Lodge & Shipley Engineers or write for catalogs showing complete line of Ram-Type, Way Type and Saddle Type Lathes.

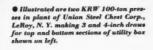
THE Lodge & Shipley COMPANY

CINCINNATI 25, OHIO

MACHINE TOOL DIVISION . 3055 COLERAIN SPECIAL PRODUCTS DIVISION . 800 EVANS ST.

WE BUILD PRESSES FOR THE JOB

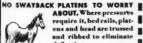






hydraulic pressure does the work. No jarring impact as the die bottoms. No shock to the worker to lessen efficiency.

DEFLECTION NIL...







GLASS OF WATER ON THE PLATEN, YOU'LL NEVER SPILL A DROP. That's howevenly pressures are distributed over the unit. That too, is another reason why dies last longer in a KRW.

BY THE TON"

... K. R. Wilson

Union Steel Chest uses KRW Presses to do the work of heavier, more expensive equipment . . . Do it as fast, at areatly

Reduced Cost!

• Many a KRW Press user discovered long ago that a large percentage of forming, drawing and stamping work does not require the use of large, heavy-tonnage presses with their accompanying high initial and operating cost. Union Steel Chest of LeRoy, N. Y. is excellent proof of this extensive. statement.

Production records, in a variety of in-dustries, show that KRW Presses greatly reduce costs. First investment is very low, operating costs are still lower. In one instance, the purchase price of a KRW Stamping Press was less than the foundation cost for heavier equipment.

KRW Presses are highly flexible...they can be built in varying bed lengths. KRW Presses are available as either Gap, Open End or Closed End Types, Tonnage pressures vary from 25 to 100 tons. Because they are hydraulically operated and not mechanically driven, they are quiet and vibrationless in operation. Platens can be stopped and reversed at any point in their travel.

Let us know your needs...we are fully equipped to engineer our equipment to handle your work. In the majority of cases, we can make delivery in a fraction of the time required for other type presses. Let us hear from you.

ALL TYPES OF DIES. We are equipped to engineer and build dies to meet your specifications. All we need is available technical data, blueprints and, where practical, a sample piece of work. We'll quote prices and delivery date.

MAME YOUR NEEDS...WE'LL QUOTE PRICE AND QUICK-DELIVERY DATE ... MAIL TODAY

K·R·WILSON

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please Send me complete information on new KRW 100-ton Hydraulic Presses.

WHY NOT USE THE BEST,

DO DRAWING COMPOUND

Fiske DS Drawing Compound is outstanding for all applications requiring a "loaded" compound. Its exceptionally high film strength prevents seizure, scoring, wrinkles and breakage in drawing high carbon, stainless steels and other difficult metals. Reduces surface tension. Soluble in oil or water. Washes off easily. Prevents rust and corrosion. Write today for information and literature.

FISKE

Metal Working

LUBRICANTS

FISKE BROTHERS REFINING COMPANY

Established 1870

NEWARK 5, N. J.

TOLEDO 5, OHIO

Design for ECONOMICAL PRODUCTION

FOR THE machine you build, or the machine we build for you, the use of Ex-Cell-O Hydraulic Power Units provides these features:

- They are compact, for inexpensive machine design.
- They have automatic cycles, for automatic production machines.
- They have infinite feeds, for proper cutting.
- They have ample power, for multiplespindle operation.
- They have variable stroke, for greater flexibility.
- They are self-lubricated, for economy in maintenance.

Illustrated here is Style 20, the smallest Ex-Cell-O unit, suitable for the high spindle speeds required for operating small diameter tools efficiently, and built to stand up under continuous, fast operating cycles. The automatic cycle includes rapid approach, infinitely variable dial adjustable feed rate (a second feed is available as extra equipment), rapid return and stop. The unit is arranged for electric start and emergency return control.



EX-CELL-0

Send for Catalog 45361. It shows how Ex-Cell-O Hydraulic Power Units can be profitably applied to many production problems.



48-38

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

ANGULAR CUTTERS SHANK TYPE For use in Weldon End Mill Holders

• For cutting dovetails and similar work these angular cutters are indispensable for the tool room and a great convenience in other milling departments. Set up time as compared with use of arbor type cutters is greatly reduced. Obviously they are truer running than the threaded hole type of cutters. Recommended for use in Weldon holders but may be readily used in collets. Just what you have always needed to save time and cut production costs. Furnished in 60° angle and right hand cut. They are stock items.

Write for Circular ACH-1



MINUTES PER PIECE with the Monarch Air-Gage Tracer'

on the

Mona-Matic

with

Rear Tool Slide

The Monarch Mona-Matic with "Air-Gage Tracer" combines the advantages of single point, uninterrupted cut metal turning with the speed formerly restricted to complicated multiple tool machines. Tools in the rear slide perform all necking cuts at any desired time during the cycle.

Tracing directly from a master template, the "Air-Gage Tracer" guided cutting tool turns out work so accurately that the amount of grinding stock may often be reduced by more than half. One operator can service a battery of two machines, easily—thereby doubling output per machine.

Like more facts? We'll be glad to supply complete details.

JOB FACTS...SAE 4620 shaft, '11" long, 13%" diameter. Produced in two operations on Monarch Mona-Matic with "Air-Gage Tracer" and rear slide. Total machining time, 1.50 minutes. Total handling time, .50 min-

utes. Set-up time, 23.25 minutes,



THE MONARCH MACHINE TOOL COMPANY . . . Sidney, Ohio



of Any Lathe

Though your lathe belongs to the Who's Who of Machine Tools, its standing will improve when it's equipped with a Skinner Chuck. This soundly designed tool is built to the highest standards to insure precision performance while increasing the productivity of any lathe.

Illustrated above is an independent chuck, one of the complete line of hand- and power-operated lathe chucks and chucking equipment made by Skinner. With a heavy, accurately machined body and rugged, individually adjustable jaws, it speeds the machining of round or odd-shaped pieces by holding the work securely and precisely for either heavy roughing cuts or fine finishing operations to extremely close tolerances.

Perhaps you are interested in replacing chucks on your older equipment. Perhaps you are buying or building new machine tools. In either case, add to the prestige of your lathes -use Skinner chucks, "The Crest of Quality." Write for the new Catalog No. 60 describing complete line of Skinner chucking equipment and machine vises.

The Skinner Chuck Co.



HAND & POWER OPERATED MACHINE CHUCKS ~ AIR CHUCK EQUIPMENT ~ FACE PLATE JAWS ~ MACHINE VISES

Apex makes the RIGHT socket wrench for YOU!

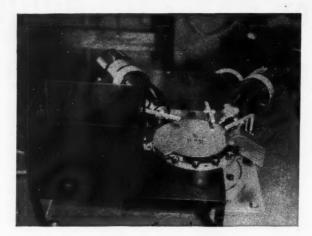
hex or square . . . standard or special nuts . . . power or hand driven . . . it's all the same to Apex! The Apex line includes standard sockets, thin wall, extra long, and extra long thin wall. Also extensions, straight nut setters, universal adapters, universal wrenches-and many others. Apex socket wrenches are accurately machined from electric furnace high carbon alloy bars-cold broached and carefully heat treated. For the hard-to-get-at places Apex universal or tension wrenches are the answer. They cannot bind or lock at any angle and they meet all safety requirements. Catalog No. 19 lists thousands of standard items. But if you need specials, just send us sketch, print or descrip-

APEX sockets

THE APEX MACHINE & TOOL COMPANY, 1028 S. Patterson Blvd., Dayton 2, Ohio

Safety Friction Tapping Chucks; Quick Change and Positive Drive Drill Chucks; Vertical Float Tapping Chucks; Parallel Floating Tool Holders; Power Bits for Phillips, Slotted Head, Frearson and Clutch Head Screws; Hand Drivers for Phillips, Frearson, Clutch Head Screws; Aircraft, Industrial Universal Joints; Sockets, Universal Joint Socket Wrenches

tion and we'll quote promptly.



Drilling, Tapping and Re-Tapping Set-Screw Holes In Plastic Knobs With One Handling

The great possibilities for time-saving through the use of Govro-Nelson Automatic Drilling Units is illustrated in the above 3-unit automatic set-up for drilling, tapping and de-burring set-screw holes in plastic knobs.

One unit drills the set-screw hole through the plastic and aluminum insert with a combination drill and counterbore. A second unit then taps the aluminum insert for the set-screw, after which the third unit (below indexing table) retaps the center hole to de-burr.

WRITE FOR Literature

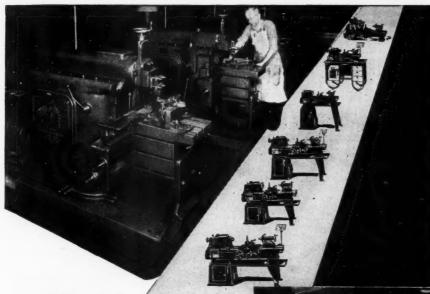
Let us show you how you can simplify your complicated drilling and tapping operations with Govro-Nelson Units, thereby reducing your production costs.

GOVRO-NELSON CO.

Machinists of Precision Parts for 25 Years

1933 Antoinette, Detroit 8, Mich.

Automatic DRILLING UNIT



machine tools to help make machine tools

It's generally conceded that the most critical buyers of machine tools are the machine tool builders themselves. The South Bend Lathe Works are typical.

Should you go through the South Bend plant you would see Rockford hy-Draulic Shapers applied to many different types of work. For example, one job involves a difficult shoulder cut on a Change Gear Bracket. Two shoulders are cut at one time . . . up to a blind shoulder. Tolerances of plus or minus 0.001° are maintained. No further finish is required, on the part.

Accurácy of the Rockford Hy-Draulic Shaper ram stroke in mainfaining the plane and length of the cut with precision accuracy, makes it the ideal machine for the job. High cutting and return stroke speeds result in fast production and lower costs.

Take a tip from the machine tool builders... compare and be critical of the machines you buy. When you do this, your choice in Shapers is bound to be a Rockford Hy-Draulic. Write for complete information and Catalog 1947.

ROCKFORD MACHINE TOOL CO.

CALIS AND SETVICE OFFICES. Allmost of Entitlement of Combissing or Oblinger Services of the Combission of Combissi



Because of Hy-Draulic design, Rackford Shapers give you speed, accuracy, and ease of operation in all types of shaper work. These elements combined mean lower costs in production or in tool room or maintenance work. Rackford Hy-Draulic Shapers are built in 12', 16', 20', 24' special, 24' and 28' sizes; Openside Shapers in 36' size.





Precision EYE CENTERED EYE Bending

with

DI-ACRO BENDERS

The DI-ACRO Bender makes perfectly centered eyes from rod or strip stock at a high rate of production. Both eye and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limits of material.

DI-ACRO precision bending is accurate to .001" for duplicated parts. DI-ACRO Benders bend angle, channel, rod, tubing, wire, moulding, chanstock, etc. Machines are easily adjustable for simple, compound and reverse bends of varying radii.

BENDER No. 1

Forming radius up to 2". Capacity 7/32" round cold rolled steel bar or equivalent. All DI-ACRO Benders have two-way action, right or left hand mounting and reversible forming nose.



BENDER No. 2

Forming Radius up to 6". Capacity ½" round cold rolled steel bar, formed cold to l" radius. DI-ACRO Benders form bus bar and other strip stock both flat and edgewise.



BENDER

No. 3

Forming radius up to 9".
Capacity "/s"
round cold
rolled steel
bar, formed
cold to 1" radius. Bender
No. 3 is especially designed for aircraft,
marine and other large
radius bending.



Pronounced "DIE-ACK-RO"



O'NEIL-IRWIN MFG.CO.

306 8TH AVENUE

LAKE CITY, MINNESOTA

LW

NEW MODEL

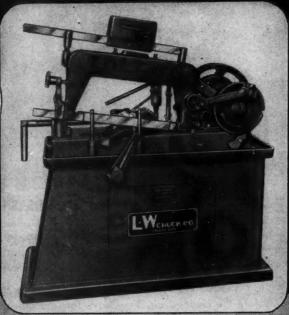
HIGH SPEED

POWE MASSAWS

\$25015

All steel welded base and table top Belt drive Rigid frame Gravity feed Length gauge Expanding clutch Swivel Vise

3-speed (90 to 130 r.p.m.) V-belt motor drive arrangement, which assures maximum power transmission efficiency . . . \$25.90 less motor. ½ H.P. 1725 r.p.m. motor recommended.



Steps automatically on completion of cut. ◆ Automatic relief of saw blade on non-cutting stroke. ◆ 6" x 6" capacity using 10" x 14" blades. ◆ 12" x 3" clutch pulley. ◆ Pulley speed 120 r. p. m. ◆ Coolant pump inside of base. ◆ Swivel vise permits cutting at various angles. ◆ Sliding bearing is devetailed to fit arm and is adjustable in all directions.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products











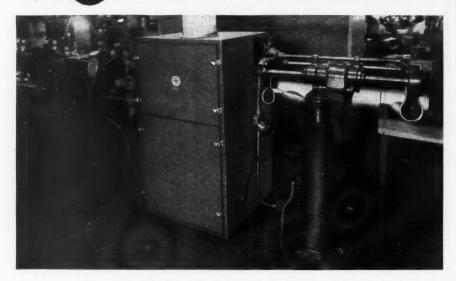




L-W CHUCK COMPANY

28 SO, ST. CLAIR ST. TOLEDO 4, OHIO

TORITI DUST COLLECTORS



are going "hell-for-leather" in this shoe factory

Dust is one of the by-products of shoe manufacture. In the shaping of soles and heels, and the buffing of finished parts, fine particles of leather, mixed with polishing and dyeing compounds are loosed in large quantities.

Many shoe manufacturers now use TORIT equipment to collect this waste and recirculate the cleaned air. They have found compact, self-contained TORIT Dust Collectors easy to install and thoroughly efficient in operation.

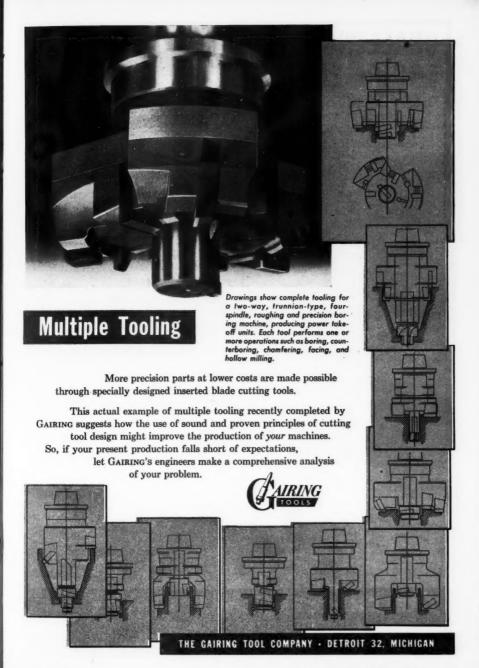


This is one of many installations showing the adaptability of TORIT Dust Collectors to the dust collection problems of different industries. They are available for immediate delivery in models ranging from $\frac{1}{3}$ HP to 5HP. For details and the latest TORIT catalog, write:

TORIT MANUFACTURING CO.

296 Walnut Street

St. Paul 2, Minn.



CHALLENGE SURFACE PLATE **EQUIPMENT** for PRECISION WORK





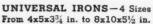
ANGLE PLATES 22 Sizes-31/2x4x4 in. to 24x24x24 in.





BOX PARALLELS - 18 Sizes From 11/2x2x4 in. to 12x12x24 in.





Want Trouble-Free Production? - Use Challenge Surface Plate Equipment!

Made from fine-grained, special analysis semi-steel castings, specially heattreated and precision ground to the required accuracy.

How They Serve -

Universal Right Angle Irons for providing square reference lines ... Angle Plates for clamping and holding work ... Box and Solid Parallels for setting and leveling to parallel and exact height for checking and inspection . . . and V-Blocks for supporting shafts and other cylindrical work when drilling, checking, inspecting, etc.

Write for Catalog of Challenge Surface Plate Equipment Today!

We rescrape and regrind surface and layout plates-Write for details of this service.





V.BLOCKS-7 Sizes From 2x21/2x5 in. to 12x12x12 in.





SOLID PARALLELS -14 Sizes-From 1/4x5/4x6 in. to 11/4x2x12 in.



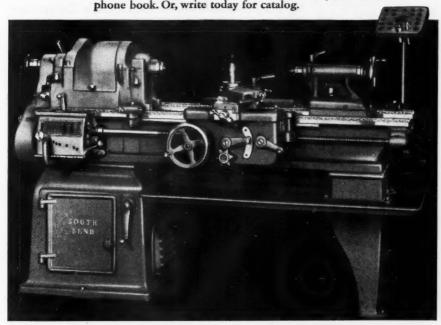
CHALLENGE MACHINERY

Over Fifty Years of Precision Equipment Manufacture"

Main Office and Factory - GRAND HAVEN, MICHIGAN

SOUTH BEND PRECISION LATHES have solved the production of precision parts for many manufacturers. Their accuracy, speed and adaptability to a wide range of operations contribute to efficient machining. Perhaps you are running some small, precision jobs on slow, heavy machines. If so, find out about South Bend Precision Lathes. These are the kind of jobs for which they are built. Their use can often effect appreciable savings. And, being reasonable in price, they can be installed without excessive capital investment.

Call our local distributor for information. His name is listed under "Machine Tools" or "Lathes" in your classified



16"x 6' TOOLROOM LATHE with handwheel collet attachment; collet rack; taper attachment; micrometer carriage stop; chip pan; thread dial; 3 phase, 60 cycle, \$2031.50 220 volt motor; and drum switch. Catalog No. 8117-C.

PRICES OF SOUTH BEND LATHES

LATHE SIZE	QUICK CHANGE	TOOLROOM MODEL
16" x 6' Lathe	\$1640.50	\$2031.50
141/2" x 5' Lathe	1382.50	1735.50
13" x 5' Lathe	1153.50	1481.50
10" x 3' Lathe	863.60	1151.60
9" x 3' Bench Lathe	312.70	481.70
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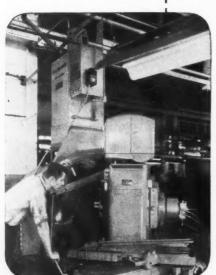
SOUTH BEND LATHE WORKS

BUILDING BETTER TOOLS SINCE 1906

427 EAST MADISON STREET, SOUTH BEND 22, INDIANA

Electro-MIST removes a hazard from high speed machining

Oil "Smog" is controlled effectively by modern AAF Electronic Collector



EAR-CUTTING machines J operating at high speeds throw off a penetrating "smog" made up of oil and smoke. It's a dangerous by-product that hampers worker visibility, results in unsightly deposits of an oily film on walls and equipment that constitutes both a fire hazard and maintenance problem. But this Gleason gear-cutting machine pictured at left is "smog-free", thanks to an AAF Electro-Mist.



AAF Electro-Mist, the electronic oil mist

and smoke collector, is suspended above the cutting machine. The oil-laden "smog" is drawn directly into the collector. Smoke, oil and the smallest impurities are removed by electronic and mechanical filtration. The results? Time spent in maintenance and cleaning is cut-danger of fire is reduced-worker visibility is improved-more healthful operating conditions are created and the cleaned air can be returned directly to the work room.

And Electro-Mist pays its own way! As much as two to five gallons of oil can be salvaged daily and piped back into the machine or drained off.

AAF Electro-Mist is a self-contained and demountable unit. Removable plate assemblies allow cleaning of collector plates at convenient locations. The unit is designed

for floor or overhead mounting. Ask your local AAF representative for Bulletin No. 251 or write direct to-

AMERICAN AIR FILTER COMPANY, INC.

100 Central Ave., Louisville 8, Ky. In Canada: Darling Bros., Ltd., Montreal, P. Q.



AIR FILTERS

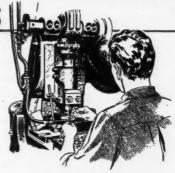
AND DUST CONTROL EQUIPMENT

NOW! Get Faster, Safer Production

From Your Power Presses

SCHRADER AIR EJECTION SETS PUT NEW LIFE INTO OLD PRESSES

Give your old power presses a new lease on life with Schrader Air Ejection Sets and see how much greater production you'll get immediately. Let compressed air blow the finished parts from your presses and free your operators from the hazards of doing this job manually. The Schrader Air Ejection Set installed on the machine shown, ejects work produced in compound dies utilizing the intermittent principle which saves air by eliminating a steady air blast. Full air blast at line pressure velocity can be kept flowing from 1/10 of a second to as many seconds as required—controlled by a timer on the pilot valve which can be adjusted with a screw driver. Act now and streamline your shop with air power. Write for complete information today. Department MMS 787.



Schrader Air Ejection Set No. 1508 With Pilot Valve helps this operator work faster with greater safety



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STURDY CONSTRUCTION begins with the base • The Sidney Lathe bed is designed for permanent accuracy under the heaviest service and differs from the conventional design in that it has four longitudinal walls with double cross girts at frequent intervals ... Actual tests show this design to be far superior to the customary two-wall construction . . . Casting is of a steel-nickel-gray iron mixture producing a close grain and smooth wearing surface that withstands years of hard service . . . Sidney Lathe beds can also be furnished with hardened and ground tool steel bed ways if desired. SIDNEY MACHINE TOOL COMPANY . SIDNEY, OHIO Builders of Precision Machinery Since 1904

BULL RIGHT TO GRIND RIGHT

ABRASIVE 11/2
SURFACE GRINDER

MOTORIZED, CARTRIDGE-TYPE SPINDLE: Entire output of 1 H.P. motor drives the 12" wheel directly through spindle carried on precision bearings... affords maximum cutting power with minimum deflection and vibration. No belts, sprockets, or chains. Dynamically and electrically balanced.

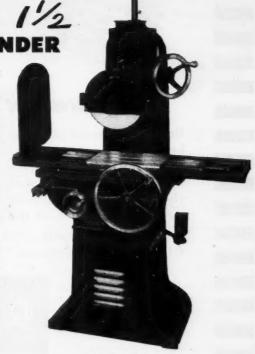
LONG WAYS - LARGE

SADDLE: Adequate support for workpiece weight at all positions. Eliminates distortion due to unsupported weight at ends of table travel. Properly lubricated for life-long accuracy. All scraped ways fully guarded against grinding dust.

HANDY CONTROLS: All controls conveniently located. Fast acting table travel speeds production — without fatiguing the operator. Downfeed by handwheel graduated to .00025" gives sensitive vertical adjustment.

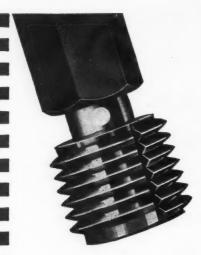
SIZED RIGHT FOR EVERY TOOLROOM: Designed and built from the ground up as a simple, hand-operated surface grinder of utmost precision. Takes work up to 15" long, 10" wide, 12" high. Table overall 48" x 111/4". Precision ground table and T-slots assure accurate setups on every job.

Abrasive Machine Tool Co. EAST PROVIDENCE 14, RHODE ISLAND



Write for Bulletin

ABRASIVE RECOVERIENT



There IS a Difference In Gages!



Drunken 7hreads?

Republic's thread plugs are checked on a specially built instrument known as the drunken lead checker, which reads directly to .0001. "Drunkenness" in setting plugs makes proper adjusting of the rings almost impossible as a "jump" will be noted as the ring is set to the master.

Republic's gages with "THAT UNSEEN EXTRA QUALITY" cost no more.

RELY ON

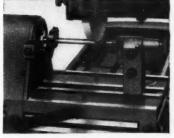


REPUBLIC

REPUBLIC GAGE

DETROIT 21, MICHIGAN

ENLARGE YOUR GRINDING FACILITIES this simple way



Grinding work held between centers. Tailstock center easily withdrawn for work change.



Angular grinding of work held in spring collet. Attachment mounted on permanent magnet chuck. New No. 616
Cylindrical Grinding
and Indexing Attachment

... FOR SURFACE GRINDERS

This Brown & Sharpe Attachment is designed to be used on surface grinders for dry grinding small cylindrical work, tapers and work requiring indexing. It represents a simple, economical way to enlarge your grinding facilities.

Straight cylindrical or tapered work is ground between centers or, if $\frac{1}{2}$ " diameter or less, can be held in indexing spring chuck. Indexing is performed with headstock index plate or with interchangeable spring chuck.

Centers swing 6" diameter; take work 5½" in length. Maximum grinding angle, 45°. 1/60 H.P., 115 V., A.C. motor is completely enclosed.

Write for illustrated folder, Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We orge buying through the Distributor

MORE THAN 9000

Bridgebort

TURRET MILLING MACHINES IN USE!

The Bridgeport Turret Milling Machine has won universal acceptance. It has proved a most valuable time and labor saver in the TOOLROOMS and in production departments of the largest plants. Its wide range and versatility in MILLING, DRILLING, BORING and SHAPING enable it to serve as the complete central machine around which all operations revolve in many small shops.

It will pay you to explore the possibilities of the "Bridge-port" in your plant.

WRITE FOR FOLDER

BRIDGEPORT MACHINES, INC.

52 DEMED STOFFT

BRIDGEPORT, CONN

SELLERS TOOL GRINDING MACHINES

Models 5T and 6T

CAPACITY
TOOL SHANKS
UP TO
3'' x 3''

Reavy Machine
Is built by

Full information covering

Among Heavy Machine
Taols built by
Consolidated are

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DRING MILLS
DRIL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
COLD SAW MACHINES
BORING, DRILLING AND
MILLING MACHINES
DRILL AND TOOL
GRINDERS
PLANERS
SLOTIERS
RAIRCOAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

Full information covering
Models 5T and 6T Tool Grinding
Machines will be supplied upon request

The Sellers Tool Grinder has a fully universal tool holder which permits any plane face of a tool to be presented to the grinding wheel without resetting, enabling it to be ground with a minimum expenditure of time and labor. Designed for grinding straight face tools and round nose roughing tools for lathes and planers. Holders and chucks can be furnished for grinding spade drills, shearing knives, boring tools and small tool bits. Capacities: Model 5T, tool shanks up to 21/2" x 2". Model 6T, up to 3" x 3".

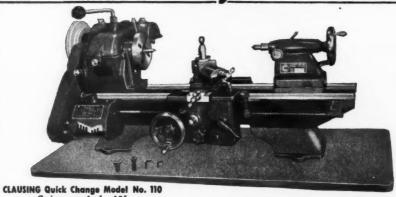
BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS . BETTS BRIDGEFORD . COLBURN . HILLES & JONES . MODERN . NEWTON . SELLERS



CONSOLIDATED MACHINE TOOL CORPORATION

Clausing LATHES



CLAUSING Quick Change Model No. 110
Swing over bed — 12"
Swing over carriage — 7½"
Distance between centers — 24"

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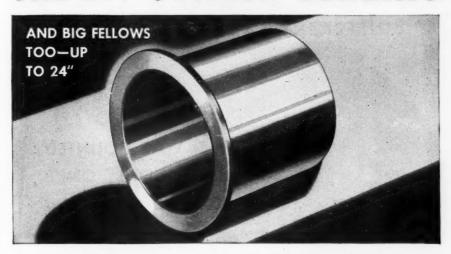
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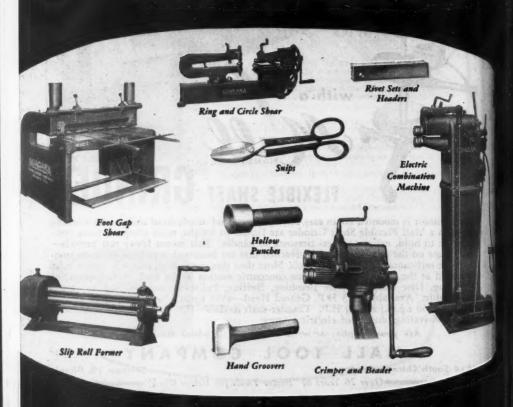
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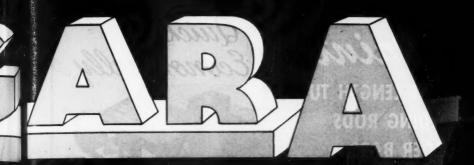
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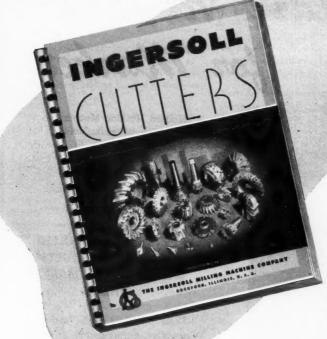
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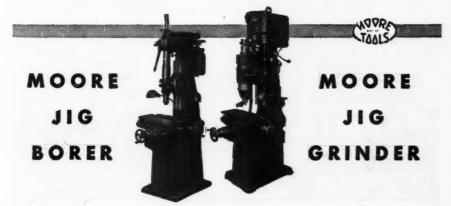
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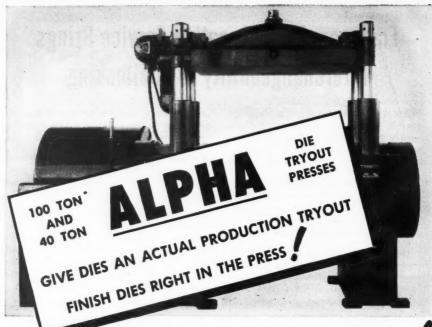
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Jul

Machine Shop

JULY, 1948

Vol. 21, No. 2

CINCINNATI, OHIO

This Month

For our feature article this month we present the first of two articles titled "Factors Influencing the Quality of Ground Gears and Worms" by L. P. Tarasov. The information contained in these articles formed the basis of a talk which was presented by Mr. Tarasov at the 32nd Annual Meeting of the American Gear Manufacturers' Association, Hot Springs, Virginia, on June 8.

A report on the Production Conference of the American Management Association held at the Palmer house in Chicago will be found on page 142. Don. H. Wimmer, special correspondent, presents a digest of the important papers delivered at this conference.

Mr. C. W. Hinman's sixth article on the subject of "Progressive Die Design" appears on page 166. In this article the author describes the construction and operation of a die in which transformer coil laminations are perforated and blanked. According to Mr. Hinman, production on these laminations in a progressive die has been reported to be as high as 66.6 blanks per second. Of unusual interest is the description of a centralizing device which provides the means for centering the work strip as it passes rapidly through the die.

A new dynamometer type of machinability tester which was recently developed in Britain is described by Robert Hutcheson, beginning on page 180. Through the use of this testing device, index numbers for the machinability of various metals can be obtained which will provide an accurate indication of the behavior of the metals in the course of machining.

"Carbides Boost Dairy Equipment Production at International Harvester" by L. W. Court is an interesting case history describing the way in which one manufacturing plant retooled several old machines and reclaimed a number of discarded machine tools in order to obtain greater production. Page 190.

A number of excellent ideas which were submitted by readers are presented in the section beginning on page 204. If you have found a short cut or a "kink" in your plant and would like to tell others about it, send a description and illustration of it to us. Each one accepted for publication will be paid for.

The "News of the Industry" section begins on page 214, "New Shop Equipment" on page 226, and the handy "Where to Get It" section begins on page 336.

Factors Influencing the Quality of Ground Gears and Worms, Part I

By L. P. TARASOV

Research Engineer, Norton Company, Worcester, Mass.

GRINDING plays a very important part in the production of gears and worms, its purpose being to develop a higher accuracy at high hardness than would otherwise be possible in the finished product. Unfortunately, certain defects are sometimes found in a ground surface, not necessarily caused by unsatisfactory grinding practice, which lower the quality of the surface.

The most obvious of these defects are surface cracks, which are likely to cause premature failure in highly stressed parts. Another type of defect is burn, which may result in the softening of a surface layer with a consequent increase in wear. Finally, surface stresses accompanying severe

burn may be high enough to cause the part to crack in service.

A variety of causes may be responsible for these surface defects, the most common being poor heat treating, grinding, or machining practice. It is very important from the practical standpoint to realize that such defects are injurious only if they affect adversely the service life of the part in question. If experience or test has shown that certain defects do not interfere with the proper functioning of the part, then there is no injury and it would be wasteful to seek their elimination.

The purpose of this article is essentially to show two things; first, how to recognize the various surface de-



Fig. 1—Cracks in a bar of hardened tool steel, caused by improper heat treatment, are numerous and deep. (actual size)

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fects and their probable origins; and second, how to avoid economically those defects known or suspected to be



Fig. 2—Section through roll to show depth of heat-treatment crack. (2/3 actual size)

injurious, so as to be in a position to take advantage of the benefits associated with grinding.

Surface finish is another aspect of the surface quality of gears and worms, and it too is important in their successful functioning. However, it is a separate subject and its discussion can best be left to those actively engaged in making or using gears and worms.

Before proceeding further, it will be well to review briefly some of the principal uses of grinding in the gear manufacturing industry. It should be noted that the term "grinding" is used in this article in the customary manner to signify the removal of material with a grinding wheel and not a running-in operation with loose abrasive, as is sometimes meant.

Gears designed for use under these conditions of extremely high stress, as for aircraft engines, invariably have hardened teeth, and these usually have to be ground to obtain the required accuracy of form and spacing. In the machine tool industry, hardened and ground gears are used primarily to reduce wear and damage in use. Other

instances could be cited in which experience has shown the desirability or necessity of hardening and grinding the teeth, but even so only a small proportion of all gears made have ground teeth.

In many cases, satisfactory results are achieved by shaving the teeth after heat treating to an appreciably lower hardness than is usual when the teeth are ground. Or the gear teeth may be produced by other machining methods, such as milling or hobbing. However, regardless of how the teeth are produced, certain other parts of the gear may have to be ground accurately in the hardened condition in order to have the finished gear function properly in service. Bores, hubs, splines and shafts are examples of this.

Hardened steel worms furnish another instance where grinding is required. Grinding is also involved in the production and in the sharpening of the cutting tools used in machining all gears and worms. Thus the quality of ground surfaces is a subject that should be of interest to many in the gear manufacturing industry.

Detection of Cracks

When cracks are present in a ground surface, they may be pronounced enough to be easily visible either directly or with an ordinary magnifying glass. Frequently, however, they are too fine to be distinguished so readily, or else they are covered over, at least partly, by flowed metal. Other meth-



Fig. 3—Cracks in a bar of hardened tool steel, caused by too severe a grinding operation, are shallow and relatively few in number.

(1½ times actual size)

ods are then required to reveal them with assurance.

The most satisfactory of these methods for steel is magnetic particle inspection, in which the test piece is magnetized and a magnetic powder is deposited on the surface. Most of the particles then concentrate on the cracks, which are thus clearly outlined. The reason for this behavior is that cracks are tiny air gaps and the sides



Fig. 4—Surface cracks in internally ground flat surface of hardened steel ring.
(actual size)

of the cracks act as the poles of magnets to which the magnetic particles are strongly attracted.

The well-known Magnaflux method is the commercial version of this procedure, and best results are generally obtained if their standard procedures are used. The particles can be dusted on as a dry powder or they can be deposited out of a liquid suspension.

Another way of bringing out cracks that are otherwise difficult or impossible to see is to etch the steel in nitric acid at room temperature. Etching for a quarter of a minute in a five percent solution of concentrated nitric acid in water will not widen the cracks appreciably, but when the surface is washed off in running water and wiped dry, the acid remaining in the cracks may seep out and discolor the surface at their borders, making it easy to detect the cracks. Aside from the discoloration of the surface, this etchant is nondestructive as it does not remove any appreciable thickness of metal. After etching, the surface should be carefully neutralized in an alkaline solution such as weak ammonium hydroxide to prevent rusting.

If the acid is considerably stronger and the etching is prolonged for several minutes, the sides of the cracks will be eaten away by the acid and the cracks will become wide enough to be directly visible. This last method is destructive since the ground surface will be etched away.

Although cracks in hardened steel can be detected by etching, the magnetic particle method is to be preferred since it is so much more reliable; moreover, it is completely nondestructive. Etching as a method of crack detection is a rather poor substitute for magnetic particle inspection but is extremely useful for indicating the presence of burn.

Hot hydrochloric acid has been used for detecting cracks in ground surfaces of hardened steel, but this acid, as well as hot or cold sulphuric acid, should not be used for this purpose because the results may be ambiguous and easily misinterpreted. The action of these acids is to not only widen cracks already present in a ground surface of hardened steel, and thus make them readily visible, but they are also capable of creating entirely new cracks if the surface is highly stressed in tension, as it is likely to be due to severe grinding.

With this explanation of how cracks in ground parts can be detected, the crack patterns that are likely to be encountered will be discussed. An un-

derstanding of crack patterns will be helpful in distinguishing between heattreatment cracks and those occurring during or after grinding. Of course, if all the material that is to be ground were to be inspected for cracks prior to grinding, there would be no question as to when cracks noticed only after grinding were actually formed. Since such inspection is rare, it sometimes happens that cracks occurring during heat treatment are not noticed because of scale. When this is ground off, the cracks become visible and may be wrongly blamed upon the grinding operation.

The principal distinguishing characteristics of heat-treatment cracks are that they are fairly large and deep, and bear no relationship, unless an accidental one, to the grain marks left by the grinding wheel. Some typical examples of heat-treatment cracks are shown in Fig. 1. A cross section of another heat-treatment crack is illustrat-

ed in Fig. 2.

On the other hand, cracks formed during or after grinding are small and shallow, and are definitely related to the pattern of grinding marks, as shown in Fig. 3, in which case the grinding direction was lengthwise. It should be kept in mind that such cracks are not necessarily the result of faulty grinding since improper heat treatment may stress a piece of hardened steel so much (without actually cracking it) that even a very gentle grinding operation will then crack the surface. It is impossible to tell from the appearance or the pattern of the cracks that develop during or after grinding whether they are due primarily to improper heat treatment, to improper grinding, or to other factors.

Several types of crack patterns are associated with grinding operations. In flat surfaces, as in gear hubs, the surface cracks are primarily perpendicular to the grinding marks. Internal grinding of the flat surface shown in

Fig. 4 resulted in several radial cracks all at right angles to the circular grain marks. The flange shown in Fig. 5 was ground with the side of the wheel on a cylindrical grinder, which left a set of grain marks tangent to a circle. The surface cracks are spiral and thus tend everywhere to be perpendicular to the grain marks. Crack patterns like those



Fig. 5—Surface cracks in improperly ground carburized and hardened steel. Cracks are perpendicular to grain marks produced by cylindrical grinding with the side of the wheel, which was too hard for the job. (actual size)

shown in Figs. 4 and 5 are observed sometimes in similarly shaped portions of hardened and ground gears.

Cracks in curved surfaces may be perpendicular to the grain marks, but in many cases they are parallel instead. The latter is very likely to occur when worms are ground. Sometimes both types are present in the same piece, one more pronounced than the other.

Still another type of cracking sometimes found in ground surfaces, primarily where contact between wheel and work has been broad, is known as



Fig. 6 — Spalling cracks at the root of a large unfinished gear tooth, caused by improper grinding.

(7/3 actual size)

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spalling. Here the cracks are shallow but they turn parallel to the surface and join similar cracks starting elsewhere, causing flakes to spall out. The beginnings of spalling can be seen in the region near the root of the gear tooth shown in Fig. 6. Another tooth in the same gear (Fig. 7) was cracked in the manner common to flat surfaces, in which the cracks are perpendicular to the grain marks, but there is also some evidence of spalling.

Nature of Burn

A hardened steel part need not be cracked to be injured for some purposes. Often the momentary high temperature which the surface reaches locally during severe grinding contact is enough to discolor the surface in spots, as in Fig. 8. This visible burn color, which is a very thin oxide film whose thickness is measured in millionths of an inch, is a warning that the physical condition of the metal immediately underneath may have been seriously affected by the high temperature.

The heat of grinding may temper hard steel, either in spots or in the whole surface layer, the result being known as soft skin. This, of course, is generally recognized to be harmful to the cutting edges of tools. When even higher temperatures are reached momentarily, the steel surface may harden if it was previously in the annealed condition, or it may reharden if it was already hard to begin with. A hard surface developed by cutting-off may cause tool breakage when it is machined. A hardened steel rehardened by grinding will be in an unusually brittle condition because the rehardened areas are not tempered. In addition to these possible hardness changes, the surface may become highly stressed in tension when it is burned. Such stresses are thought to lead to premature failure of parts under severe service conditions.

Although all traces of visible burn are often cleaned off in the final passes, it should always be kept in mind that any hardness changes or stresses resulting from the momentary high temperatures remain in the surface layers of the steel.

The extent to which the hardness may be affected by the heat generated in grinding is illustrated by the curves in the graph Fig. 9. These were obtained on surface ground blocks of oil

Fig. 7—Cracks in another tooth of the gear shown in Fig. 6, also result of improper grinding.

(1/3 actual size)

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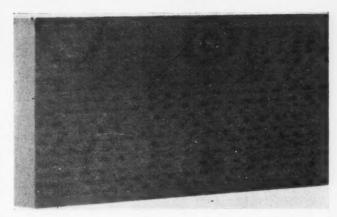
Fig. 8—Burn marks in hardened high speed steel caused by too hard a wheel which chattered badly. (2/3 actual size)

hardening tool steel hardened to Rockwell C60, but curves for other steels, such as are used in ground gears and worms, would be similar.

The Knoop hardness numbers (simiilar to Brinell) were obtained with a 100-gram load on the Tukon Microhardness Tester. The indentations were extremely small, roughly 0.002 inch length, and only one-thirtieth of that in depth, so that the hardness changes below the ground surface could be accurately determined. The Rockwell C hardness scale corresponding to the Knoop scale is plotted at the right for convenience: of course, no Rockwell measurements could actually be made because this method is not sensitive enough to detect hardness changes in extremely thin layers.

In order to be able to make Knoop indentations at closely spaced intervals just below the ground surface, it was necessary to prepare a section not perpendicular to the surface, as is usually done, but a taper section making a very small angle with the surface. The distance below the ground surface was proportional to the distance along the taper section measured from its intersection with the ground surface, with one inch along the taper section corresponding to 0.010 inch depth.

Curve A is for a specimen that was not burned during grinding—there was no detectable change in hardness even at the very surface. More severe grinding conditions caused a slight drop in



hardness in a layer less than a thousandth of an inch thick, as is seen from Curve B. When the grinding was even more severe, the surface layer was rehardened, at least in spots. Just below this layer, the temperature rise during grinding contact was insufficient to result in rehardening, but enough to temper and thus soften the steel to an appreciable extent. The hardness gradient is shown in Curve C.

Detection of Burn by Etching

From a practical point of view, the detection of burn by means of hardness changes is usually much too laborious. Fortunately, there is a much simpler and more rapid way of detecting burn and of estimating its severity. This is to etch the ground surface and to observe the resulting discoloration.

Hardened steel that has not been tempered remains light in color when etched in nital*; tempered steel, on the other hand, darkens when etched, the degree of darkening increasing with the tempering temperature. Hardened steel that is to be ground is likely to be in a tempered condition, and it will

^{*} Nital is a metallographic etchant containing several percent of concentrated nitric acid in methyl or ethyl alcohol.

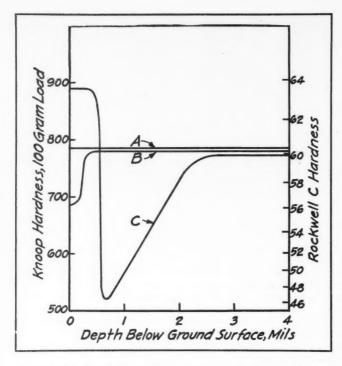


Fig. 9—Hardness gradients below surface of hardened blocks of oil - hardening tool steel which were ground with various degrees of severity. A-ground gently; no burn or hardness change. B — ground severely; moderate burn and slight drop in hardness to a depth of a quarter of a mil (0.00025 inch). C - ground very severely; surface Tehardened to a depth of half a mil and softened below that to a depth of two mils.

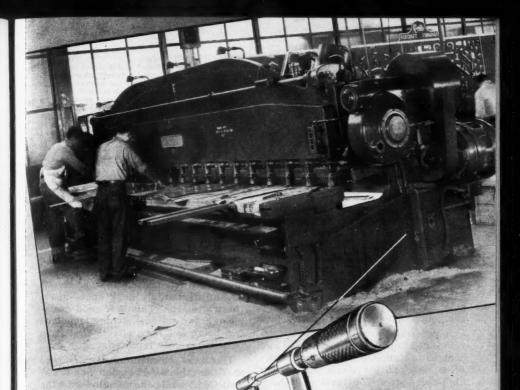
etch a light or medium gray.

Areas softened by severe grinding will etch darker than the portions of the surface not affected. Thus it is possible to bring out the effects of grinding heat when all traces of visble burn color have been removed. The simplest way of doing this is to etch the work for perhaps 30 seconds in 5 or 10 percent nital. The contrast between tempered spots and the rest of the steel is only moderate but is generally satisfactory. High-speed steel, which is much more resistant to etching, may have to be etched for several minutes in a 10 percent solution of nitric acid in water.

When the grinding conditions on hardened and tempered steel are particularly severe, certain areas in the surface may reach such a high temperature and then cool instantaneously to the temperature of the rest of the steel, which is relatively cold, that they become rehardened. If the visible burn marks are ground off and the piece

is then etched in nital, the rehardened areas appear white. The area adjacent to each rehardened area must have reached a fairly high temperature, not enough to cause rehardening. but enough to cause considerable softening, and for this reason it appears dark on etching.

An example is shown in Fig. 10. All three pieces of a hardened and tempered steel were ground simultaneously end to end, severely enough to leave brown burn marks on the surface, which are visible in the piece on the left. The other two pieces were then ground cross-wise very gently with a soft wheel, about half of the burned surface being left untouched. About 0.002 in. was removed in this manner, the crossground surface having a bright finish and showing no sign of the original burn. The piece on the



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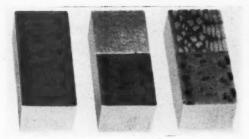


Fig. 10—Samples of hardened tool steel that were burned severely when ground lengthwise. Part of the burned surface was removed from the piece in the center by gentle grinding, leaving the upper half apparently unburned. The piece at the right has been similarly cleaned off, but then it was etched in nital and the rehardened areas showed up as white spots while the adjacent softened areas become dark.

(1/3 actual size)

right was then etched in 10 percent nital for 30 seconds, and the rehardened areas appear white while the softened ones are quite dark. The left edge of this piece was not burned appreciably in grinding and this is a neutral gray. Thus the burn marks were made to reappear after the original burn color had been purposely destroyed by the gentle cross-grinding operation.

A procedure has been recently developed to improve the sensitivity and contrast attainable with burned surfaces of hardened steels other than high-speed steel. This involves etching for 15 seconds in a 4 percent solution of nitric acid in water, rinsing in hot water and then in acetone, and finally etching for 15 seconds in a 2 percent solution of hydrochloric acid in acetone, followed by rinsing. (Percentages are by volume of concentrated acid.)

An example of the high contrast obtainable with these etchants is shown in Fig. 11. The piece of oil-hardened tool steel at the left was badly burned by bringing the grinding wheel down forcibly onto the surface when the table was stationary. The original burned area is clearly visible.

The other piece was handled in the same manner, but all trace of burn was then removed by grinding in normal fashion below the bottom of the gouged-out portion, leaving an apparently undamaged surface. Etching, however, indicated at once that this part of the surface had been complete-

ly rehardened, while the immediately surrounding area was softened by the heat flowing out of the region in contact with the wheel. The traverse grinding operation used to remove the visible burn caused a slight tempering of the rehardened area, as shown by the moderately dark spots inside the white area. This is a good example of how a suitable etching technique can bring out burn effects that have been apparently removed.

Hardness measurements showed that the rehardened region was Rockwell C64.5 while the remainder of the bar was C61, this being the usual hardness of this particular steel when properly tempered after quenching. The rehardened zone was entirely too hard and brittle, since it had no opportunity to be uniformly tempered after it was formed.

A portion of a badly burned worm made from carburized and hardened steel is shown in Fig. 12. All signs of visible burn had been cleaned off during the grinding operation, but etching revealed that the curved portions of the thread were softened by over-tempering except near the crest. Regularly spaced chatter marks that rehardened and etched as white spots can also be seen. The flat crests were burned relatively little in the cylindrical grinding operation. The unground portions etched a neutral gray. Had the worm been ground without being burned, all of it would have etched this same shade of gray.

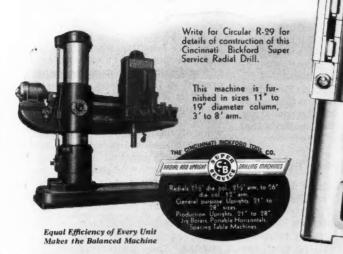
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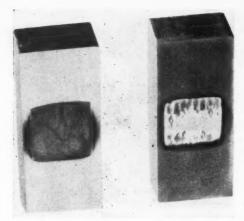


Fig. 11—Samples of hardened tool steel burned badly by plunging wheel into work on a surface grinder. The piece on the left shows the original visible burn. A similar burn mark was ground out gently in the piece on the right, which was then etched to bring out the rehardened (white) area surrounded by a soft (dark) boundary. (actual size)

After a part has been etched in order to detect burn, the last traces of acid must be neutralized if it is to be kept from rusting. A few minutes in a weak solution of ammonium or sodium hydroxide suffices. It is considered good practice to dip the piece in a rust preventive solution as the final step in its preservation.

The detection of burn by any of the etching procedures as described is, in most instances, a nondestructive process. Experience has shown that parts inspected for burn by etching can generally be placed in service without any noticeable effect upon their useful life. Although the work is discolored by etching, there is no appreciable dimensional change. The discoloration can be removed, if necessary, by polishing, Vapor Blasting, or other methods that provide a good finish.

Sensitivity of Steels to Grinding

Although the immediate and apparent cause of grinding cracks and burn is grinding, the real cause may be something entirely different. It is only by finding the real cause or causes of the surface defect that the most economical remedy can be determined.

For example, heat treatment may

leave hardened and tempered steel in such a sensitive condition that it cracks readily even when it is ground with reasonable care. Sensitivity simply means that the steel is brittle with respect to the grinding operation even though it is not necessarily brittle according to ordin-

ary tests. Although it may be possible to eliminate cracking by grinding the sensitive steel more gently, this would naturally raise the production cost. The proper way to eliminate cracking would be to reduce the sensitivity of the steel by improving its heat treatment, if circumstances permit it.

The carburized steels present the most difficult grinding problem. Hardened gears and worms are made from these steels to a considerable extent. Carburized steels have been found to be highly sensitive when there is too high a carbon content in the outer portion of the case. This excess carbon is present as iron carbide, or cementite, which is a hard, brittle, nonmetallic substance. When, as often happens, the carbide is in the form of a heavy network of massive particles, the carburized and hardened case is very brittle and is easily cracked in grinding. In fact, the case is occasionally known to crack even when it is ground in the green state, that is, with the steel carburized but not yet hardened.

The sensitivity of such carburized parts can be greatly reduced by improving the microstructure. This means preventing the formation of massive carbides, either as heavy net-

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July



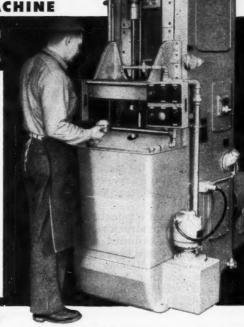
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part moves up to broaching position and pull head automatically engages broach and pulls it through work. At end of stroke, part drops on shelf and is manually un-

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works or as individual particles. The most straightforward method is to carburize with this in mind. However, there are many instances where this is not feasible and the problem becomes one of eliminating the undesired excess carbon.

This can be done by permitting the carbon to diffuse into the steel so that the case becomes somewhat deeper and more uniform. Diffusion is accom-



Fig. 12—Portion of hardened worm burned in thread grinding and then etched.

(2/3 actual size)

plished by leaving the steel at the carburizing temperature for several hours in a neutral rather than in a carburizing atmosphere.

Another way of eliminating the unsatisfactory microstructure is to cool slowly from the carburizing temperature so that the case is relatively soft. The thin layer containing the excess carbon can then be machined or ground off, sufficient care being taken to avoid cracking the brittle carbide. Even in the soft condition a case with excess carbon is somewhat brittle, but not nearly so brittle as when it is hardened. After this step has been taken, the part can be hardened and ground without too much risk of cracking.

Another metallurgical source of grinding difficulty is incomplete hardening caused by retention of some of the high-temperature phase known as austenite. In normal hardening practice, steel is quenched to transform the austenite to martensite, which is then immediately tempered to prevent cracking. If some austenite has been retained for any reason, the localized

heat and stresses introduced by grinding may cause the retained austenite to complete its transformation. As a result, surface cracks may appear then or later, since the freshly formed martensite is very brittle, being in the untempered condition.

Experience has shown that elimination of retained austenite by suitable changes in heat treatment has been accompanied by a marked decrease in grinding sensitivity. Until recently, high-speed steels were particularly troublesome to grind, but with the adoption of double and even triple tempering as standard practice, cracking difficulties have practically disappeared. The reason is that multiple tempering effectively eliminates retained austenite and tempers the resultant martensite prior to the grinding operation. The producers of high-speed steel gears and other cutters report no difficulty from cracking in grinding because they take the pains to heat treat the parts properly.

Other Metallurgical Factors

Steel which had been decarburized is occasionally difficult to grind, and the cause can easily escape notice. If the decarburization has not been completely removed by machining prior to hardening, or if it occurs during hardening, a wheel that has been properly selected for grinding hardened steel may start loading while in contact with the soft decarburized layer. When the loaded wheel does come into contact with the hard steel, it is likely to burn the work and may even crack it. This problem has occurred in the grinding of aircraft engine gears.

In order to eliminate this difficulty, it is necessary to remove the decarburized layer prior to grinding. Machining off more stock before hardening, or heat treating in a controlled-atmosphere furnace may be the solution. If there is only slight decarburization in hardening, thorough blast cleaning may remove the decarburized layer.



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Hardness specifications may be the source of considerable trouble. When a steel is harder than Rockwell C60, an increase in hardness of only one or two points may make it much easier to crack in a severe grinding operation. It has also been observed in the grinding of high-speed steel gear cutters that increasing their hardness by as little as a single point on the Rockwell C scale can lead to visible burning where none existed at the lower hardness level.

Unfortunately, hardness specifications are often written with only a lower limit. Ordinarily, the parts are hardened just above that limit and the correct grinding conditions are chosen for that hardness. However, occasional lots come through several points harder, and these are passed by the inspection department because no upper limit has been set on the hardness. Since the grinding foreman is not informed of the higher hardness, this lot is ground exactly the same way as the standard lots, which are somewhat softer. The result may be an epidemic of cracking which is sure to be blamed on the grinding department. The real source of the trouble is not the grinding, the inspection or the heat treatment, but rather the loosely written specifications.

Sometimes certain lots of a steel crack much more easily in grinding than do other lots of the same steel even though the hardness is the same. The only explanation that can be given at the present time is that there is something in the processing of the steel through its various stages that has affected its response to heat treatment and hence the completeness of the hardening transformation.

Dimensional Factors

Dimensional irregularities may be very troublesome in connection with grinding. They may be due either to insufficient care being taken with prior machining operations or to distortion occurring during heat treatment.

When gear teeth or worm threads are ground, machining tolerances can be made reasonably wide. However, it is necessary to set definite limits on the part when it has been completely machined; otherwise, it would not be feasible to set production rates in the grinding department. Unfortunately. there is often a tendency to leave more stock for grinding than specified, with the thought that grinding can easily take care of the additional metal. This is true enough if each part is handled individually but not when parts are ground more or less automatically on a production basis. When excessive stock has to be removed in grinding without any allowance being made for it, burning and cracking of the ground surface are likely consequences. If grinding is expected to take care of all previous errors, then it is necessary to seek out the high spots first and production has to be slowed down considerably.

The other common source of dimensional irregularities is distortion arising from the response of the steel to heat treatment. The extent of the distortion will depend upon the steel, the heat treatment, and the design of the part. Distortion can usually be decreased somewhat by modifying these three factors but some distortion is likely to remain. Gear teeth are ground primarily to take care of this distortion.

In the aircraft industry, gears are made as thin and light as possible so that distortion is a very important problem. At times, the distortion is such that most of the stock has to be ground off one side of some of the teeth. In some cluster gears, one or more of the smaller ones cannot be ground because of space limitations and it becomes necessary to compensate for radial and timing errors in

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the unground gears by suitably grinding the others. Thus timing accuracy may have to be obtained by doing practically all of the grinding on one side of the teeth. Such abnormal grinding conditions can easily lead to burn and cracking unless the work is done with particular care.

(The second part of this article will appear in the August issue)

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American Management Association Production Conference

By DON H. WIMMER

Special Correspondent

COST reduction through a more intensive application of work simplification and industrial mobilization and military procurement requirements were top interest subjects at the May 13-14 Production Conference of the American Management Association at the Palmer House in Chicago. For the first time in several years, case histories of cost-cutting and a more flexible budgeting for overhead and the transfer of production controls to a tabulating basis, took precedence over direct labor problems.

There was a profound interest in practical methods of cost and quality control aligned with achievement of greater output per worker unit based on simplification of work processes. rather than the achievement of this objective through former crude incentive and speedup practices. The prime objective of this newer line of management thinking centers around building more quality into manpower and humanizing the job wherever possible. Practical methods of applying this principle were demonstrated by Allan H. Morgensen, director of Work Simplification Conference, Lake Placid, N. Y., in a series of 10 selected industrial films and a special demonstration staged by men selected from the audience in a test of skill, which later was

projected on the screen. The idea was to show plant management how easy it is to produce special films in their own plant to demonstrate new work simplification methods with their own personnel.

The day to day evidence that the spiral of inflation will continue for some time, accentuated by "the spector of Russian determination to settle all international matters according to her own dictates, as reported by Simeon E. Leland, dean of the college of liberal arts of Northwestern University, has forced a program of rearmament on the government, which has caused it to embark on a gigantic remobilization or defense program.

The sudden importance of a rearrangement of working technique directed to the end of getting more production per manhour and machine time, is the result of the determination of the government to rearm. The inference of the text of many of the carefully prepared papers delivered in the two-day rather technical conference, is that, unlike the armed preparation period preceding World War II, the country now is suffering more from a manpower shortage than a manpower surplus. Therefore it is essential that plans be laid now to assure adequate production from curey ecc bal dir sta apj are mo clir sun

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rent manpower. The best method available is more work simplification. Very little was said or discussed on further or expanded use of incentive or speedup plans. The emphasis decidedly is toward making it easier for the worker and the machine to increase the ratio of production from the same manpower and machine capacity that now exists. The subject of wages was carefully avoided.

This assumption was aptly explainey by Leland in his discussion of the economic horizon, when he said "if a balance is struck and the pulls in each direction are guessed at-and understand no precision is attempted—it appears that the prevailing currents are still inflationary. The rate of movement upward seems to have declined somewhat. Business and consumers approach the future with caution. The government seems likely to continue if not increase current expenditures, so long as Russia applies its intermittent power pressures on the international scene. Relief from high taxes and high prices seem remote. Business recession this year seems doubtful."

Association members were warned by Alvin Dodd, AMA president, that the government is going to step in overnight when the next war comes. This move will come suddenly. There will be no time to get ready. We must be ready. He indicated that industry should gear planning to meet any sudden change that may occur in the international situation.

This forecast was, in effect, backed up by Capt. William J. Marshall, USN, chief of the Manpower Utilization Division, Munitions Board of the Military Establishment, Washington, D. C., who spoke largely off the record at the Friday luncheon, attended by both members and visitors from outside of the AMA rolls.

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"start its industrial mobilization planning now for any future emergency." He did not predict war. He emphasized that "preparedness at all times is the keystone of national security. In modern warfare, it is even more important that both industry and the military forces be equally well prepared."

Answering anticipated questions bearing on what to do and how to go about planning for participation in munitions and arms manufacture, Capt. Marshall advised management to plan in general along the lines of the production programs used during the last war. The situation will be the same. There will, of course, be changes in products and product detail, but in general it may be safely assumed that, for example, while the plants which made six by six trucks for the Army, Navy and Airforce will again be called on to produce trucks, the specifications may not be the same, "but it seems a fairly logical assumption that you will make some similar type of truck. This simple assumption will allow you to make tremendous strides in your planning." car

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This general outline "will allow you to plan for your sub-contractors, for the power, water and fuel which you will need for the assumed production. Are these three essentials still available in the requisite quantities and from the same source you used before? Probably not, then you are going to have to find a secondary source. How much transportation will you need to carry out your assumed production schedule? Maybe the railroads cannot furnish you that much under existing conditions. What then? How about the raw materials you will need? If they are in short supply even now, what could you use for substitutes?"

"How about your personnel? How many are in the reserve elements of the Armed Forces? How many will be



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caught in a future draft? How long will it take to train reliefs for people you will have to lose? These are only a few of the questions you can and must answer."

He said "we are hoping that each one of you will start your individual industrial mobilization planning now. It will save you time. It will save you money, and in a future emergency it may save our country."

He urged management to get in touch immediately with one of the procurement offices of the three military departments "and discuss the possibility of having your plant assigned to the service represented by that procurement office."

According to Capt. Marshall, tentative arrangements of this sort are being made now between industrial firms and the military departments. "Your plant may be able to make the sort of item that would carry a very high priority in wartime. Procurement offices are anxious to make arrangements with plants of this type."

Although no definite date has been set for the actual placing of government orders under the defense program, it can be assumed that it will be very soon. Some educational orders will be placed first, to be followed by firm orders shortly thereafter. Many of the procurement functions will be made by joint staffs and others by collaboration between the various procurement agencies. Capt. Marshall invited interested executives to write him at his Washington office for more detailed information on anything pertaining to the procurement program.

He explained that "privately owned manufacturing capacities will be tentatively allocated in advance by the Munition Board among the three departments of the National Military Establishment, for production for the most important and hard-to-get items, excluding those in early stages of experiment or development. This al-



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3, to acquaint industry with its task in wartime, and to encourage industrial planning for rapid industrial mobilization;

4, to promote orderly distribution of the initial production load of war re-

quirements:

5, to maintain a current record of competent producers and their capaci-

ties:

6, to determine what required items cannot be provided for by conversion of private capacity, in order to establish requirements for construction of new facilities:

7. to minimize requirements for new construction in wartime by properly

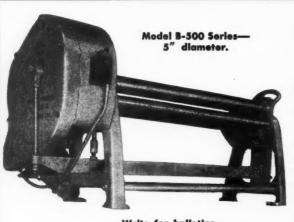
planning the utilization of existing facilities;

8, to provide a basis on which private industry can estimate production costs, to facilitate negotiation of contracts:

9, to make advance provision for essential civilian needs, and

10, to develop in advance a system of records adapted to use by a control agency in the clearance of important contracts.

After allocations are made, military procurement agencies will confer with responsible authorities at each plant and draft a program for the tentative war production manufacturing load, including arrangements for expansion or conversion of facilities at each plant. The Munitions Board will control placements of such provisional orders and arrangements by a clearance procedure, but the initiative and primary responsibility rests with the procurement offices of the military ser-



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Sunoco Emulsifying Cutting Oil is a viscous, self-emulsifying oil that quickly and easily forms a stable emulsion with water. It contains no animal or vegetable fats, and will not turn rancid.

Sunoco Emulsifying Cutting Oil meets the demand not only of tough cutting jobs, but also of a wide range of turning, milling and grinding operations calling for close tolerances and fine finishes. It is particularly efficient where precision is demanded in high-speed machining.

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SUN PETROLEUM PRODUCTS



"JOB PROVED" IN EVERY INDUSTRY

vices, Capt. Marshall explained.

He said \$3 billions worth of equipment and supplies will be purchased in the fiscal year of 1948 for the Armed Services, of which 65 per cent will be bought under single service purchase agreements, 13 per cent through joint purchase agencies—chiefly medical supplies and petroleum products, and 6 per cent by collaboration purchase organizations; leaving 15 per cent uncoordinated.

There is no question of the seriousness of the armament program. It is a functioning enterprise. It is rolling rapidly toward fast action. Leading industry and labor leaders have been supplied with copies of the industrial mobilization plan. These leaders represent all phases of industrial activity.

So serious is the situation that it moved Milton M. Mandell, chief of the Administrative and Management Testing, U. S. Civil Service Commission, Washington, D. C., to warn that "the commitments of our country are such that maximum utilization of our manpower and natural resources is necessary in order to maintain a high level of governmental and industrial productivity."

He urged more consideration be given to the selection and training of top executive and supervisory personnel at once. His idea is to give careful consideration to the human qualities of the top men as well as to their particular technical abilities. "Stress should be placed on the administrator's sophisticated understanding of the administrative process, of what makes an organization click, of the effects of his actions on morale, on administrative coordination, and on the maintaining at a high level the organizational equilibrium of the group for which he is responsible."

Some of the methods suggested to meet the projected new production problems facing management under



Send us your old drills—we'll make them new again at a fraction of the cost of a new drill! Exclusive NU-TANG° process replaces twisted or broken tangs with brand new tangs of correct size—and with GUARANTEED ORIGINAL STRENGTH. No welding—No distortion—No shortening of drills—No sleeves.

Any drill, reamer, or other tool with a Morse taper in sizes 2 to 6 can be repaired perfectly this quick new way. Delivery—One week. Used by many leading industrial plants. Amazingly low cost—satisfaction guaranteed! Send for complete information.

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In the illustration above you see the two main gantry supports of the mammoth Marion Strip Mining Shovel being machined in the Mahon machine shop. Each support is 58 ft. long and weighs 16 tons . . . further evidence of Mahon's ability to meet your welded steel requirements regardless of dosign, size or weight. A staff of Steel-Weld design engineering experts, backed by highly skilled craftsmen, are your assurance of every advantage of Steel-Weld Fabrications.

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MAHON

July, 1948

MODERN MACHINE SHOP

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HOW TO SAVE YOUR DIE SETS



with ACRO Die-Set **PULLERS**



Simply attach an ACRO PULLER. The patented index screw wrench raises the punch holder straight up, holds it at any height. No pounding, no prying, no struggling, no frayed



Notice how cleanly the die set separates. You save up to 50% in die production time alone.

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the new industrial mobilization program when it comes, include the application of a more flexible budget for overhead factory expense, as explained by L. J. Karmen, assistant to the general manager, Crosley Division, AVCO Manufacturing Corp., Cincinnati. Ohio.

To achieve this desired goal, Crosley based its flexible budget for overhead factory expense on 12 levels of direct labor. These ranged from no direct labor through \$160,000 a month. Allowable expenses for each of the 12 levels were called out on each item of expense, and a simplified cost system was worked out, with the result that management now gets daily reports of actual overhead as compared to the budget. Factory overhead costs are now decreasing as a result of the new control system, he said.

C. A. Woodley, assistant general factory manager, Caterpillar Tractor Co., Peoria, Ill., said cost control can become effective only when well planned schedules are consistently realized from month to month and year to year. "We try to maintain a policy of scheduling realistically in line with the capacity of the plant to produce an availability of raw materials, consistent with the requirements laid down by the sales department."

He said the responsibility of all product schedules is invested in the merchandise department. Cost control concerns itself with two principal functions: first, the productivity of direct labor; and second, the utilization and productivity of indirect labor and control of all supplies necessary to the operation. A performance report is placed in the hands of every foreman by noon of each day, covering the activities of every man in his section for the previous day. The report is in percentages and tells the foreman the distribution of indirect labor by hours and labor accounts, and the ratio of indirect to direct labor.



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27 Spindle Speeds

with only 2 control levers



Convenience of control and ease of operation are two of the outstanding characteristics of the new "American" Pacemaker Lathe.

Imagine being able to secure any one of 27 spindle speeds thru only 2 conveniently placed direct reading levers without having to refer to index plates or having to retain lever positions in one's mind. Operators are enthusiastic in their praise of this new speed control. It makes their work easier; they produce more work because of it and the pay roll dollar buys more as a consequence.

This and other fine features of the "American" Pacemaker are thoroughly covered by Bulletin No. 16.



CINCINNATI OHIO II S A

Another Caterpillar shortcut is achieved by sending all processed materials direct to the plant of assembly, bypassing warehousing. Plans are on a long range basis. Present scheduling plans project into 1950. All schedules are planned 12 to 16 months in the future. Caterpillar leans heavily upon assigning as much of management responsibility to the ranks as possible. Good foremanship is the best production incentive. Production comes when the foreman is given the authority to manage on his own. Caterpillar does not use incentive plans. If a foreman has confidence in the company and its shop standards, he will share that confidence with those who work for him. Anything less than 100 per cent productivity is unsatisfactory. Each foreman supervises from 20 to 50 men. Time study at Caterpillar is strictly a management operation without participation by union or other elements.

The foreman is responsible only to his immediate superior.

Production costs must be reduced if we are to survive competition, A. H. Roosma, assistant to the president, Republic Steel Corp., Cleveland, warned with emphasis, with the statement that the need for cost reduction is as necessary today as it was in the 1930's. We need to re-examine the factors of statistics and standards and to take immediate action to improve the present cost situation.

He said "the problem of cost reduction is the chief function of the industrial engineering department. Methods to reduce cost of direct labor should be the first objective of any cost reduction program. The trend is upward. Incentives and piecework are tools to the end of reducing labor costs. Individual supervisors should be held responsible for performance of their departments, on the idea of the indivi-





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A djustable Blade Milled Chasers or Hollow Mill Cutters —for your medium and short run jobs, Circular Ground Thread Chasers or Hollow Mill Cutters—for your long run jobs,





Standard Vers-O-Tool Headavailable in Styles DS (Stationary), DR (Revolving), and DBS (For Brown & Sharpe machines) equally adaptable for Circular or Adjustable Blade Cutters.

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Make your Vers-O-Tools more versatile than ever!

Use the standard circular-type groundthread chasers for high-speed, highly accurate production on long run jobs. Then, with the same Vers-O-Tool head, you can get this fast, close tolerance work on medium and short run jobs—using the new, more economical adjustable blade milled chasers.

They're equally adaptable to all three styles of Vers-O-Tools within the popular range of cutting sizes from $\frac{3}{8}$ " to $\frac{15}{8}$ ".

These new adjustable blade chasers are positioned to the specified cutting size by positive, quick diametric adjustment of the Vers-O-Tool, just as when it is equipped with circular chasers—and the

same double-barrel micrometer gage is used to provide an accurate check before and after grinding.

An exclusive design feature is the provision for take-up of block after each grind; the chasers are always up to proper cutting position regardless of the number of grinds or the requirements for different materials cut.

Vers-O-Tools are preferred for their simplicity of construction—and for their versatility. They are your best bet for fast, economical work on all production jobs in your shop. Ask for detailed literature and prices.

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Acme-Gridley Dar and Chucking Antomatics:
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- Capacities No. 2 Mach. Screw to 1½" Hand Taps.
- All Settings Adjustable To Give Any Angle—Relief—Hook.
- Taps Held in Precision Collets Can Be Sharpened After Center Is Destroyed.
- Standard Motor Any Current Specification.

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1277 West 3rd Street Cleveland 13, Ohio dual supervisor being in business for himself."

"Work simplification plans are very effective in all steel and related plants, including mining operations. There can be no results without the full assistance and cooperation of top management. Work simplification plans at Republic are based on objectives of 10 per cent above past standards. Steel "is going hell-bent" for cost reduction, through use of new incentives, piece work, work simplification and other methods. Steel is getting ready to offset upped labor costs. About 65 per cent of all labor time will be affected by various work simplification plans."

Arthur Kurtze, production control manager. The Geometric Tool Co., New Haven, Conn., advised tool and die makers to limit inventory to not more than six months and to keep it down to actual estimated needs. His company has worked out an order system that eliminates considerable cumbersome paper work by the simple expedient of placing all entries into one 12-sheet manifold form which is typed in the production control department. and enables handling of orders on a straight line basis. The new order control system has lowered handling costs and improved manufacturing efficiency.

Attitude surveys serve a most useful purpose in determining management-labor relations, George S. Case, treasurer, The Lamson & Sessions Co., Cleveland, said. His company uses the "open door" policy of dealing with personnel. In this way many minor "kicks" are easily disposed of to the satisfaction of all concerned. Attitude surveys uncover the employees' real feelings toward the company and its policies and provide a base for building policies and standards.

According to Mr. Case, "a survey revealed that it is not practical to retain foremen who are more than 20 years older than the men under them. In the

July, 19



For Brown & Sharpe, Cleveland, Cone, Davenport, Greenlee, Gridley, Acme-Gridley, National Acme, New Britain, and New Britain-Gridley Automatic Screw Machines.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.
PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

case of competent foremen who have been with the company a long period, we assign a younger assistant to handle the younger men in the work crews. Foremen old in years of service are a valuable asset."

"There is need for more cooperation on the part of both management and unions in a genuine effort to reach better and more workable relations. At best the position of management with the union may be likened to that of a family being compelled to house some of its inlaws. No union man can be a good time study engineer and a good union man at the same time. Therefore he is not invited to sit in on time study plans."

William M. Passano, president, Waverly Press, Inc., Baltimore, Md., described committee management as a good answer to unionism. In his plant the committee passes judgment on such problems as work spoilage, building and plant equipment maintenance and various grievances, including wage scales in relation to price levels. Some of the committees have executive and others only advisory authority to make decisions. The committees are Activities, Quality Control, Facilities and Wage Price. Members must have served at least three years with the company and individuals can serve on only one committee at a time. Members are appointed by the board of directors.

Committee membership has proved to be a good proving ground for future management material. Cooperation in plant problems creates good will. Books of the company are completely opened to the committees, a factor which allays suspicion of any withholding of information from the personnel.

Quality control as the measure of adherence to pre-specified standards was described by Prof. Edwin A. Boyan, Department of Business and En-



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Redesign eliminates 12 operations, reduces Unit Cost 65 cents





3000 P.S.I. for plugs without threads. Changeover elim

Redesign with Waldes Truarc rings not only saved us 65 cents a unit and 61/4 minutes production time, it made a more compact and finer product-reports Electrol, Inc., of Kingston, N. Y. Truarc helped cut. 4 ounces a unit, eliminated milling and tapping, allowed switching from skilled to semi-skilled labor. Maintenance was cut more than a half.

Redesign with Truarc, and you will cut costs and increase production, too. Wherever you use machined shoulders, nuts, bolts, snap rings, cotter pins-there's a Truarc ring that does a better job of holding parts together. All Waldes Truarc retaining rings are precision engineered, easy to assemble and disassemble, always circular to give a never-failing grip. They can be used over and over again. Send us your problem. Waldes Truarc engineers will be glad to show how Truarc can help you.

15 Waldes Truarc Retaining Rings effect these Savings

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- Eliminate 2 milling operations . \$.10
- Reptace 10 tapping operations with grooves
- Increase accuracy of mating parts 03
- Replace pipe plugs with plugs
- made in automatics
- Cut plug assembly time over 50 % 15

Total savings per unit . . \$.65

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gineering Administration, Massachusetts Institute of Technology, Cambridge, Mass., as possessing the qual-

ities of enhancing quantity.

Prof. Boyan pointed out that "quality cannot be inspected into a product. Quality is properly achieved by the producing or manufacturing personnel as they are operating the process. The degree of quality effectiveness is contingent upon the amount of brains and skill that can be summoned to locate and throttle those factors that contribute to unsatisfactory quality levels."

O. H. Somers, quality control engineer, Standard Gage Co., Poughkeepsie, N. Y., stated that 100 per cent manual inspection of detail parts is almost a complete failure wherever it is used. This has been proved by actual tests. The most obvious solution to this problem, is to attack the process which is producing such large percentages of scrap, so as to reduce the direct, tangible losses in scrap, and the tangible losses due to trouble in final assembly and damage to quality production."

Warren R. Purcell, manager of quality control, Sylvania Electric Products, Inc., Salem, Mass., describes how his company arrived at a satisfactory system of quality control that brought excellent results. The five high points of the system are:

1. There should be quality control men in the organization who are not crowded with daily responsibilities;

2. Quality control administrators should have access to the direct line of authority, but should rarely have to use it:

3. New techniques and methods should be introduced by evolution

rather than by revolution:

4. Classified sampling and inspection cost analysis can provide adequate quality assurance, make inspection cost sensitive to pre-inspection quality, and provide powerful incentives to improve quality at the source, and

158

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instead of 3 ordinary tappers to tap No. 2-56 to 3/6" in stee!!

Plus additional advantages

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2. Floating Chuck Jaw and Adjustable Friction Drive to prevent tap breakage.

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4. Compact, Light Weight Aluminum Housing, occupies

absolute minimum for tap capacity.

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2-A Cap. 3/8" to 7/8" in Steel. 3-A Cap. 1/2" to 11/4" in Steel ALL UNITS EFFICIENT AS PRODUCTION THREADERS USING

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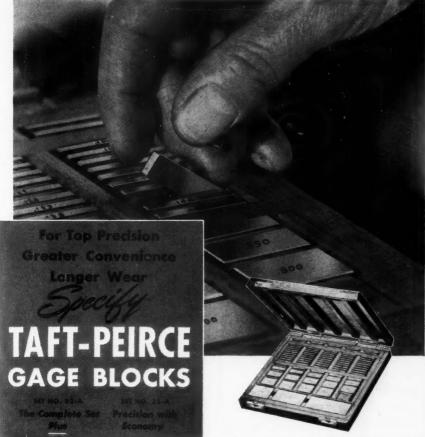
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STYLE NO. 9500TC

Tungsten Carbide Wear Blocks— Life Insurance for your Master Standards

These new and different gage block sets offer time-saving convenience with extra value and Taft-Peirce precision.

Set No. 82-A includes, in addition to the usual 81 standard sizes, an extra block of .10005", extremely useful for checking in half-tenth combinations where tolerances are close.

Set No. 35-A includes the 35 blocks needed to make the most commonly used combi-

nations—a smaller set but the same standard of accuracy.

Two sizes of Tungsten Carbide Wear Blocks are now available, measuring .050" and .100". They can be wrung to either or both sides of a combination, to bear the wear and tear of working contact, adding life to your gage block set, far beyond their cost. Get your order in today.

GAGE BLOCKS (All Sers Packed in Mahogany Case) WEAR BLOCKS
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only \$195.

Parts and Collets for all HALCO Heads
Quick Delivery—Order NOW!

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Veet Manufacturing Co.

5. Improvements in quality control can effect savings of tens of thousands of dollars annually in inspection costs.

Ernest L. Fay, quality control advisor, Deere & Co., Moline, Ill., outlined a set of rules for starting an effective quality control program designed to work from the operating level. The principal elements are:

1. All department heads, foremen, tool designers, design engineers, production engineers and inspectors must realize that they are each a member of a team and each must assume his full share of the responsibility and cooperate with each other, all working for the same end;

 A foreman and his operators must be responsible for producing a quality product, not the inspection department;

Foremen must cooperate with the quality control man and see that subgroups are maintained, where it is possible to operate with sub-groups;

4. For the first time the inspection department has a tool that will tell him how much inspection to do to insure quality.

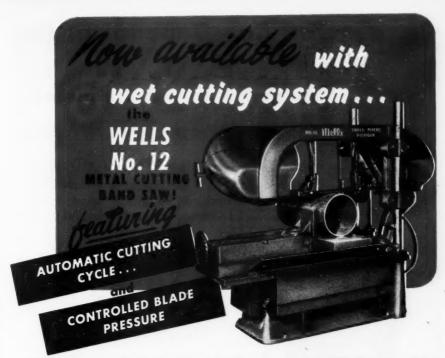
Meinhardt Diamond Wheels. A 16-page two-color catalog covering resinoid bond and metal bond diamond wheels has been released by the Meinhardt Diamond Tool Co., Dept. MMS, 2800 Milwaukee Ave., Chicago 18, Ill. The catalog presents data on the selection, operation, and types of Meinhardt Diamond Wheels (including their list prices) which include straight, straight "E" and round face, plain and flaring cup, dish, straight raised hub, cylinder, mounted, and other types. Information is also provided on hand hones. Copy free upon request.

Brown & Sharpe Center and Small Hole Attachment Set No. 573 for use with B & S 6-inch and 150-mm. vernier calipers Nos. 570, 571, and 572 is illustrated and described in a four-page two-color pocket-size folder now available free from the Brown & Sharpe Manufacturing Co., Providence 1, Rhode Island.

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The heavy duty, hydraulically operated Wells No. 12 Metal Cutting Band Saw, with automatic cutting cycle and special blade pressure controls, is now available with a NEW time and money saving extra—the Wells wet cutting system. This complete self-contained system permits safe use of higher f.p.m. cutting speeds and increases blade efficiency. Installed as an integral part of the saw, the system includes chip pan, fluid tank, centrifugal type pump unit, screened intake splash guards, and flow control valve. Ask your Wells Saw Dealer for full information or write direct to the factory.



Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION 808 TYLER STREET, THREE RIVERS, MICH.



You Can Depend on the F. T. I.

For Better Work-Less Lost Motion

The outstanding superiority of the FALCON T. I. DRIVE rests not so much in its fine material and expert workmanship, but in the almost unbelievable speed with which it can be assembled and disassembled.

A slight twist of the wrist and click the tool is solidly in place. A slight turn in the reverse direction-click-it's free and out.

It adequately fills a long felt want and efficiently overcomes practically all of the objections to straight Shank Tools. No knocking . . . no hammering into place . . . no shaking . . . no loose fitting.

The extreme rigidity of this new T. I. drive makes it ideal for interchangeable Carbide tip Counterbores and step Cutters.

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Straight and angle type nipples for horizontal or vertical working operations. Permits quick changing of tools. Eliminates hose kink. Increases efficiency.

convenient shut-off valve within operator's reach.



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PIPE ENDS

Quick-lock sleeve, will not accidentally uncouple, Requires a quarter-turn to lock or unlock. Female threads made in six sizes: from 1/4" to 11/4"

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AIR VALVES

Pressure seated air valve with male thread at one end, groove i hose shank at Made for Hose Size 1/2" and 3/4" other. Provides a

AIR VALVES

Angle permits hose line to fall away from valve and eliminates kinking. Valve has only three parts. Troublefree construction assures long life.



made in 4 sizes

BLOW GUNS

All of Dallett's Blow Guns are made from brass, The lever valve style is made in two sizes: 1/4" and 3/4". Extensively used wherever air is employed.



Lever Style



Button Style

BLOW GUNS

Dallett's shrouded button valve design Blow Gun eliminates possibilities of breaking or bending valve stem. Made from brass in 1/4" and 3/4" sizes.

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MASCHER AT LIPPINCOTT STREET, PHILADELPHIA 33, PA. Manufacturers of Pneumatic Tools and Accessories

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WINTER BROTHERS TAPS ARE DEPENDABLE



More than modern equipment and good materials are needed to make taps of Winter dependability. Equally critical is the ability to combine the various manufacturing steps into one efficient whole. Winter engineers have more than 47 years' experience in tool design and manufacture. This engineering knowledge, combined with the facilities of a new and modern plant, helps build dependability into Winter Taps and Dies.



Always at Your Service

YOUR LOCAL DISTRIBUTOR carries a complete stock of Winter Taps on his shelves—as close to your tapping problems as the telephone on your desk.

Winter Brothers COMPANY
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July

PERFORMANCE IS BUILT INTO NATIONAL METAL CUTTING TOOLS

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National makes a complete line of standard and special Reamers, including toper and chucking Reamers in high speed and carbon steel, and shell types in high speed steel only. Other National tools include Twist Drills, Counterbores, Milling Cutters, Hobs, and End Mills.



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of NATIONAL Cutting Tools. Call
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Every bit of steel that goes into National Cutting Tools is rigidly inspected and tested. At the same time, National conducts its own research into the properties of new steels as fast as they are developed. For example, the qualities of hardness and toughness, as related to tool life, are special subjects of National's raw material studies at all times. Methods like these build better performance into National Cutting Tools.

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Progressive Die Design, Part VI

In this article the author describes a precision die which is designed for the production of transformer coil laminations by the billion.

By C. W. HINMAN Designing Engineer

SECTIONAL dies of progressive design in which radio transformer coil laminations are perforated and blanked and stacked automatically in chutes at the rate of four blanks per press stroke, are among the most amazing of tools. The workpieces are

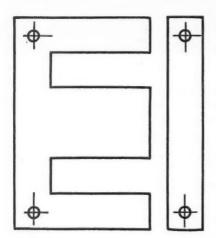


Fig. 15—Drawing of standard "E" and "I" core laminations for radio transformer amplifying colls. Laminations of this type are blanked from .016 to .018 in. steel strips.

the so-called "E's" and "I's" which are cut from thin silicon steel strips. Figure 15 shows a drawing standard E and I, and Fig. 16 shows a layout sketch which indicates the method of blanking these workpieces without wasting material. Eight standard lamination sizes are available for standard transformer coils, however, dozens of other odd shapes of laminations are made for use in special transformer coils.

The assembled press tool, shown in Fig. 17, has been designed with the utmost care in order to assure troublefree operation so far as is possible. The tool is designed in such a manner that only three work stations are required: (1) Pierce eight holes; (2) blank the I's and stack them in a chute; and (3) sever the E's in two equal pieces and stack one of them in a chute, while delivering the other on two rods which are located at the left side of the press. Years of painstaking work were expended in developing this die design and its delivery chutes, in fact, the design and construction of the tool parts and chutes are the major features of this equipment.

Fig. 16—Preliminary sketch showing the die layout for cutting I's and E's.

Design and Construction of the Die and Chutes

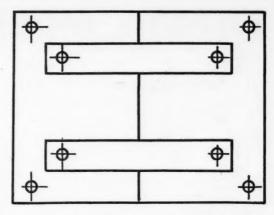
The die is built to precision limits. Important dimensions are within tolerances of tenths of thousandths of an inch. The die is built up in sectional parts so that the interiors of the die openings may be precision ground before assem-

bly. Grinding the interiors of the die openings assures that the proper dimensions of the blanks which are processed in the die will be maintained.

To prevent a sidewise movement of the die sections on the die shoe M, two steel blocks are provided, one on each side of the sections. Each bar is fitted into a 0.375-inch slot which is milled on either side of the die shoe and made secure by six screws F. Each of the die sections is secured to the die shoe by means of at least two screws and two dowel pins. Each of the end sections R-1 and R-5, is provided with a tongue projection on the under side which is fitted into a 0.375-inch milled slot in die shoe M.

The interior surfaces of the dies and all cutting edges are provided with cemented-carbide strips which are brazed in place. The die bushings G and I are also made of the same material. There are cases in which as many as two million thin silicon steel blanks have been cut in carbide lined dies before regrinding became necessary.

The die set requires an extra thick die shoe for the reason that die section R-5 must be set deeply into the shoe, as shown in section A-A. This extra thickness provides for a sufficient amount of "slant-away" angle on



R-5 to permit the cut-off lamination V to slide down and then right itself and straddle rods O-O properly. The E-laminations on the slanting rods are caused to move forward along the rods due to press vibration, and are then joined together at the lower ends of the rods from which they are removed in bunches and placed in containers. Section R-5 must be constructed with a sufficient amount of height in order that it may be reground a number of times without destroying the delivery slide, even after other die sections have been reground down to their height limits.

Spring-punch U, held in a tapped hole, is adjustable in height. This punch in descent, contacts lamination V at the instant it is cut off on the edge of R-5, and in further descent pushes the severed lamination down into the slide-away-angle in channel section R-5.

Positive stop L is mounted across the open channel in R-5. A shoulder under this stop projects down $\frac{1}{16}$ inch to ensure that final lamination V will register correctly before it is cut off by the descent of punch S-2.

The die openings in the accompanying drawing Fig. 17 have been sectionlined in order to make them easier to identify. Die section R-3 projects into

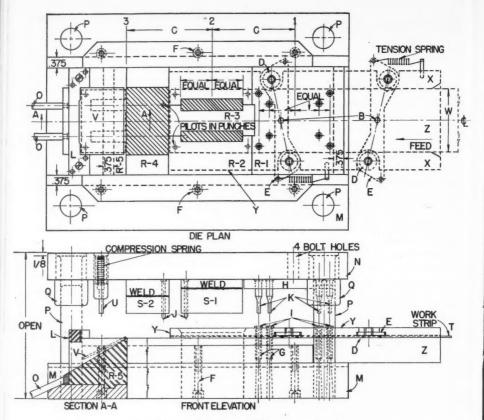


Fig. 17—Drawing of assembled progressive die.

a notch cut in die block R-1, and thus provides space for inserting the last two die bushings G-G, at the left. Die block R-1 is made of low grade tool steel not hardened inasmuch as the hardened die bushings in this block are designed to do all the cutting.

The two I's are blanked in station 2, by punches S-1. The blanks are then forced downward by the punches into a long chute which is attached to the under side of the bolster plate. The chute is made in two channels of brass castings which are file finished inside and the channels are then bolted together as indicated in Fig. 18. The

chute provides a 10-inch vertical passage through which the blanks pass downward and also a 12-inch radius loop toward the rear of the press. Next, the blanks move up a 45-deg, angle slant of the chute into a horizontal portion of the chute which extends over the top of a table located behind the press. Here the E's and I's are removed in bunches and placed in containers. The downward force of the punches against preceding cut laminations which are already located in the chutes forces the blanks to move along the chute each time additional blanks are cut.



It takes more than taps alone to get accurate threading at the lowest possible cost. When you call on Besly, you get more!

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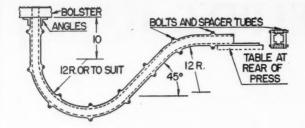


Fig. 18—Drawing of a design for a chute which may be used to facilitate stacking "E" and "I" laminations.

of harder metals.

Punch plate H is made of low grade tool steel but not hardened. Tool

steel is preferred for this plate over other types of steels because of its inherent toughness which will assure that holes and punches will be maintained in their proper positions. Centralizing bars E are made of $\frac{3}{16}$ -inch thick ground tool steel stock but are left soft.

Stripped plate Y is constructed as a one-piece channel type stripper and the material is machinery steel, furnace annealed before machining and then pack hardened. An economical feature of this die set is that the outside di-

In the last station, one E lamination is blanked through the die and is carried to the rear of the press in a chute similar to the one just described.

Punches S-1 and S-2 are welded to machine steel flanges. The cutting edges of these punches may be lined with cemented-carbide to provide for long wear. However, since the die does most of the cutting and the punch simply pushes the blank through, and because punches are far easier to replace than dies, these punches are made of high-speed steel and without a lining

AUTOMATIC FLUTING OF TAPS and SPIRAL POINTING

Few small machine tools function in as many useful capacities as the 50 F. It not only has possibilities as a production grinder but also serves in many precision operations such as grinding of reamers, taps, milling cutters and small metal cutting saws. It indexes automatically and thus can be operated with unskilled labor.

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Photo of assembled Honing Units mounted in storage rack.

- Fast Selection for Any Hole Size
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The steady increase in the use of Sunnen Honing Machines in tool rooms for producing accurate internal diameters, has led to the introduction of these convenient mandrel sets.

Each mandrel set consists of completely assembled Honing Units shipped in storage racks and ready to use in your Honing Machine (see illustration).

Four mandrel sets cover the complete range from 1/4" to 2%" in diameter. Sets may be bought at discounts up to 17% from list price of individual items.



Illustrating one com-

It will pay you to investigate the advantages of these sets. Write for Bulletin XSP-5005—or, on request, a Sunnen engineer will be glad to visit your plant to discuss your honing problems.

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Canadian Factory: Chatham, Ontario

SP-334

ameters of punch bodies K and bushings I and G are of equal dimensions. This feature provides for greater economy when the holes for these parts are jig bored. Plates H and Y may be clamped together during the jig-boring operation, following which the same hole diameter can be bored in die block R-1 as in plate H. All the holes will then be in perfect alignment for mounting the punches and dies.

Precision Specifications

No burrs are permissible on the edges of the blanks. Therefore, punch and die clearances are held to a minimum of 0.0002 inch around the punches. Four substantial guide posts **P** are used, usually 1% or 1½ inch diameter. Phosphor bronze guide bushings **Q** are used in order to reduce excessive wear. An oil pocket, designated by the ½-inch dimension in the front elevation of Fig. 17, is provided to as-

sure a constant supply of lubrication. The lubricant remains within the ½-inch deep pocket because the bushing shoulders **Q** are of a length which will assure that the ends of the posts will not be exposed on the up-stroke.

The question naturally arises: Why are precision dimensions necessary on a blanking die for cutting parts that have no mechanical movement in assembly? Here are the answers: (1) If the laminations have burrs, these burrs may cut through the insulating material with which they are coated or covered in processing them into coils and thus cause short circuits. (2) The lamination sizes must be accurately maintained because of the requirements of the automatic assembling machines which are used for inserting them into the coil openings. (3) Demand for laminations is greater than any one manufacturer can satisfy, and when radio manufacturers, for example, buy laminations from several suppliers, they must all be of precision sizes.

WILLEY'S "606" UNIVERSAL CUTTING GRADE

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Rousselle

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• This 25-ton Rousselle Horning Press with adjustable bed table can be quickly and accurately raised or lowered to suit the die to be used. Press can be furnished with special table to permit a maximum shut die height of 28". Unique design permits slugs or blanks to fall through table without interference from elevating screw.

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OU'LL find you can finish dies rapidly and efficiently with Norton Mounted Points and Mounted Wheels. They contain a combination of sharp 38 ALUNDUM abrasive and vitrified bond that insures a fast, smooth cutting action and a long, useful life. And they're available in 200 handy sizes and shapes.

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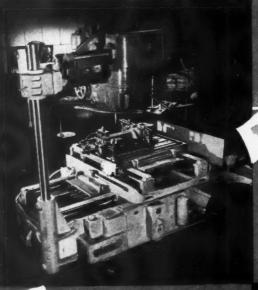
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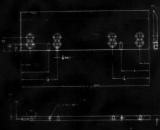
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This maker of fine printing presses not only saved time on every job handled by a BULLARD Man-Au-Trol Spacer but also diminated 75 hole-locating jigs in three months for a total saving of \$2500 to \$3000.

BULLARD CREATES NEW METHODS TO MAKE MACHINES DO MORE

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Centralization of the Work Strip

Die shops have spent thousands of dollars in attempting to discover a dependable work strip centralizer that would take care of the cross camber which may be found in coiled strip stock. The commercial limit for this is ¼ inch in each length of six feet, but even that is too much when cutting blanks for laminations.

Since the blank length of laminations and width of strip **W** are equal, the width of strip, as it passes rapidly over the dies, must be centralized almost perfectly if evenly cut blanks are expected. The centralizer must take care of the camber.

The centralizer that has met these requirements is shown at B, D, and E, in Fig. 17. It has its faults, of course, but experience has shown that it does its work better than other designs which have been tried and abandoned.

Centralization of the work strip is accomplished by the slight oscillating movements of the two lever bars E which carry four rollers D that straddle the strip, as shown in the die plan. Lever bars E are mounted on centering pins B in stripper plate Y, and the rollers are maintained in constant contact with the strip edges by means of the tension springs attached as shown. Lever bars E work in a clearance slot which is cut across the stripper plate channel, and rollers D extend into a counterbored hole 1/32 inch deep in E. so that the strip has no chance to slip under the rollers and thus defeat the purpose of centralization.

A central stud turned on each roller is a running fit in hardened steel bushings inserted in E. Some shops use rollers made of Stellite or cemented-carbide, which reduces possible wear to practically nothing. Piloting pins on the faces of punches S-1 and S-2, also help to keep the strip centralized. It will be observed that levers E are mounted in reversed positions, that is;



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HEAD • MODEL 50

**MODEL 50

**Lead **Indentify of the furnished in sharp face furnished in sharp f

NUMBERALL STAMP & TOOL CO.

the rollers are located in positions that describe a truncated figure shown by the centerlines through B and D. This was determined by experiment to be the best arrangement of rollers to take care of cross camber in the strip.

None of the punches or dies are provided with shearing cuts, as that would be unnecessary in blanking thin stock, and it would tend to distort the blanks.

This press tool is operated in a gapframe press but the press is not inclined. An automatic roll feed is used in connection with a reel upon which the coiled stock is mounted. If an ordinary No. 3 press is speeded up to 120 strokes per minute, and four blanks are cut per press stroke, the potential hourly output is 28,800 blanks. However, this large output must be reduced 20 per cent because of necessary "down time" for setting up a new coil in the reel, and entering a new strip. There are also other unavoidable stops that reduce the output. Twenty per cent would reduce the potential output to approximately 23,000 blanks per hour.

Using a Dieing Machine, a potential output of 144,000 blanks per hour can be attained. Using a late model of the oscillating-die press, sometimes called the "Super-speed Press," and which is easily capable of running 800 strokes per minute, the potential output would be 192,000 blanks per hour.

However, in cases where extra high speed presses are used, more than 20 per cent must be deducted for setting new coils, because setting up and entering a new strip occurs much more frequently than with presses of lower speeds. Cases are on record where the Super-speed Press was run at 1,000 strokes per minute making four blanks at each cut, producing 4,000 blanks per minute, and we must admit that cutting 66.6 blanks per second is pretty fast production.

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There are Disston files for all needs, including a complete line of Disston Swiss Pattern Files . . . precision made for precision work.

For other metal-cutting tools of extra quality, ask for DISSTON METAL CUTTING BAND SAWS ... HACK SAW BLADES ... CIRCULAR SAWS ... CARBOLOY FITTED CIRCULAR SAWS ... TOOL BITS.

Write for FREE folder, "What File?" showing recommended procedure in selecting proper file,





Staggered teeth eliminate file tracks ... make finished surfaces smoother. Rounded gullets form curls instead of chips ... thus to a great extent are self-cleaning.



HENRY DISSTON & SONS, INC., 721 Tacony, Philadelphia 35, Pa., U. S. A. In Canada, write 2-20 Fraser Ave., Toronto 1, Ont.

Testing Machinability

A new dynamometer type of machinability tester has been developed in Britain for use as a simple workshop tool.

By ROBERT HUTCHESON

THE advantage of quoting an index number for the machinability of metals, in much the same way as hardness values are quoted as Brinell numbers or Rockwell numbers, has been apparent to engineers for some years. A machinability index would give the manufacturing engineer an accurate indication of how he could expect a metal to behave in the course of machining, and would also give added

value to the figures quoted for tool life, hardness and so on.

Following up this idea, a machinability tester, suitable for workshop use, has been developed in Britain by Machine Shop Equipment Ltd., Spencer Street, London, S.W.1, England. The tester enables any average machine operator to conduct a rapid and accurate test on a sample of metal in the lathe. Provided that a few simple rules

are observed with this instrument, the machinability index can be read from a dial without the necessity of calculations while a cut is being taken on the test piece. The instrument actually measures the vertical or tangential cutting force imposed on the tool, and experience has shown that, if the instrument is correctly used, this factor alone is a reliable measure of machinability.

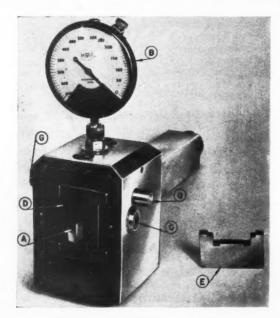


Fig. 1—Illustration showing machinability tester for workshop use. By standardizing several variables it is possible to simplify the making of tests. The machinability index of a material is given as a number on the dial.

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10" diameter indexing plate geared to provide 4-8-12-16 or 24 positively locked stations. Table top or indexing plate may be drilled, tapped or otherwise machined for mounting jigs and fixtures. Available with either mechanically operated or solenoid operated Beslows Air Motor. Easily synchronized to machine movement to operate automatically. Operates in any position.

The Bellows Rotary Feed Table comes complete with quick coupler, Lubro-Unit (air filter, air lubricator, air pressure regulator and gauge), and 6' of air hose, the only air connection required.

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924

The Bellows Co.

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Construction of the Instrument

The instrument, shown in Fig. 1, consists of a head attached to a shank that can be clamped in a lathe tool post. A cutting tool A is clamped in an internal main lever which is pivoted in the head. The lever is so mounted that it is capable of movement only in a vertical plane, against the action of a spring. The vertical or tangential force, to which the tool is subjected during cutting, will cause a downward movement of the tool, against the pressure of the spring; the reading then given on the dial B indicates the amount of this force and movement, and is interpreted as the machinability number of the material.

The dial can be swung around so that it can be read from any position. The tool is clamped in the main lever by means of the two socket head screws C that pass through the upper wall of the head. Swarf and coolant are prevented from passing the cutting tool, and so entering the instrument, by means of a small shutter D that closely embraces the tool and slides vertically with it.

In order that a machinability number may have a universally-understood value, it is essential that tool shape be standardized and that tool wear be kept at an absolute minimum. This procedure is logical and follows the practice of using indenters of standard shapes and size in hardness testing machines. However, tool shapes necessarily vary and in order to obtain optimum results when a variety of materials are to be turned, a series of eight standard cutting tools has been developed to cover the turning of ferrous and non-ferrous metals.

Such standardization of tool shape eliminates many variables that otherwise would have to be considered when determining machinability. A knifetype tool is employed, the angles and



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Maxitorq features that win approval from builders of machine tools, machinery and a

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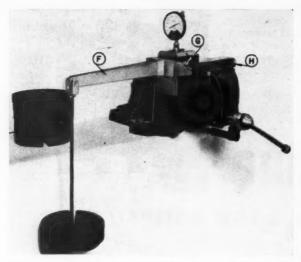


Fig. 2 — The machinability tester can be checked for accuracy by the use of weights and a beam. If necessary, it can be re-cali-brated or corrected by means of a screw at the rear end of the shank.

turning. The amount that the tool projects from the face of the head of the instrument is important as it affects the leverage at which the cutting force acts. To facilitate setting, a simple bridgelike gauge E is provided.

Tool wear is reduced as much as possible by

the adoption of cemented carbide tipped tools as standard. When regrinding the tools, their original standard shapes must be maintained.

nose radii of which are standardized according to the materials to be cut.

The tool should be set, with ordinary care, at center height as is usual in

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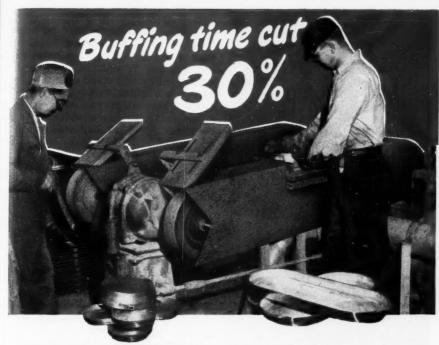
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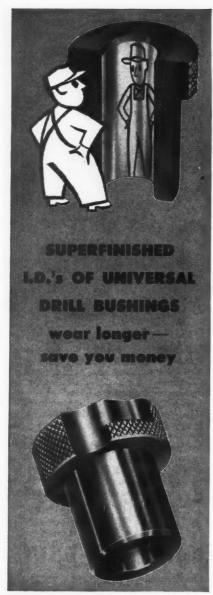
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UNIVERSAL ENGINEERING CO. FRANKENMUTH 9, MICH.

Cutting Conditions

Cutting conditions should be made constant to within certain limits so that, again, the number of possible variations may be reduced. Experience shows that cutting speed cannot be regarded as a critical factor and that variations between 30 and 500 feet per minute have little or no effect on the machinability index indicated by the instrument.

The area of the chip should be maintained constant, and in order that the Instrument shall not be cumbersome, this area has been fixed at 0.001 square inch. This area should be obtained with a ratio of depth of cut to feed per revolution approximating 4 to 1; i.e., if the feed is 0.016 inch per revolution, the depth of cut should be 0.062 inch. This ratio is not unduly critical; the nearest available rate of power feed can be selected and the depth of cut then chosen which corresponds to it.

Thus, although the machinability index obtained by means of this equipment is actually a measurement of the vertical cutting force needed to remove a chip of a selected cross-sectional area and shape, it can be referred to merely as an indicator reading. Therefore the indicator reading will have the same value and meaning in metric-using countries and in countries using the British system of weights and measures.

Checking and Re-Calibrating the Instrument

Provision is made for checking the instrument and, if necessary, re-calibrating it. The prescribed method of checking the instrument is illustrated in Fig. 2. The main internal lever in which the cutting tool is clamped can be "loaded" with weights, and the readings on the dial checked against the load.

For this purpose a beam F, having

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35 SCIENTIFICALLY SELECTED SETS FOR EVERY TYPE OF SERVICE

This new Williams line consists of 35 scientifically matched assortments of various types and sizes of tools, carefully selected and grouped for specific uses. "Supersockets," "Superrenches," pliers, chisels, screw drivers, etc. are included in these many versatile collections.

There are "Supersocket" Sets in 1/4, 3/8, 1/2, 3/4 and 1" drives with socket openings from

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a forked end, is used. The fork is equipped with a pair of flat and knifeedge pivots that engage with a pair of pins G which project from the sides of the head, and with a knife edge that rests in a V-groove in the upper face of a "calibrating" dummy tool that is clamped in the main lever in place of a standard cutting tool.

In order that the moment of a force applied to the calibrating tool shall match that of a corresponding cutting force, the V-groove in the calibrating tool is located at the same distance from the main lever pivot as is the point at which the cutting force will act. When weights are hung on the stirrup at the free end of the beam, the force which they exert on the dummy tool (a function of their own weight and the effective length of the beam) will be indicated by the reading on the

If errors are present in the instrument they can be corrected by means

of the adjusting screw arrangement H located in the rear of the shank, acting on the tail end of the internal main lever which extends to a position near to the end of the shank.

The quality of a product is very largely dependent upon the composition of the metal, but costs are largely dependent upon the machinability. The term "machinability" has in the past been more or less ambiguous, but in the future the use of an instrument such as the one described in this article will make it possible to reduce the measurement of machinability to a fairly definite science.

Standard Carbide Blades. A bulletin presenting illustrated, descriptive, and tabular information on standard carbide blades for all types of milling cutter bodies has been prepared by the Wisconsin Carbide Tool Co., 2439 W. Fond du Lac Ave., Milwaukee 6, Wis. Copy of Bulletin No. 101 free upon request.

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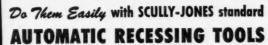
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U GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

Carbides Boost Dairy Equipment Production at International Harvester

By L. W. COURT

Works Engineer, International Harvester Company Farm Implements Division, Richmond, Indiana

OMPLETE retooling with carbide tools of our Farm Implements Division at Richmond, Indiana - where mechanical parts for cream separators are made - has enabled this plant to more than double production without increasing cost per piece, despite a raise of nearly 16 per cent in hourly labor rate and a substantial increase in material costs. Moreover, this increase in production actually has been achieved with fewer machine tools in operation than were formerly required. Other benefits noted from the use of carbides include increased life of tools between grinds: elimination of certain costly machining operations; and better finish on the work produced.

At the time the decision was reached to retool with carbides in order to trim the swiftly-mounting costs of machining certain cream separator parts such as gears, pinions, main frames, spindles, bowl bases, and so on, it was found that a considerable amount of our equipment was old and incapable of operating at the high cutting speeds called for in order to obtain optimum results with carbides.

Therefore, we set up a program in cooperation with the Carboloy Company for modernizing our existing equipment. The majority of the changes required fell into the follow-

ing three categories:

1. Increasing the horsepower of the machine tool.

2. Increasing the rigidity of the machine frame.

3. Decreasing the amount of friction in the machine.

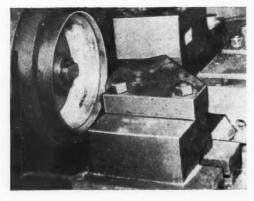


Fig. 1—A typical stainless steel operation at the Farm Implements Division of International Harvester is turning the counterbore in bowl shells made from No. 410 stainless. Use of Carboloy tools made it possible to step speed up from the 300 s.f.p.m. formerly used to 1200 s.f.p.m.

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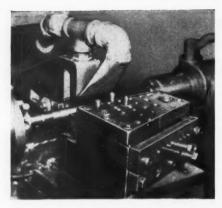


Fig. 2—Use of cemented carbide tools on this job of turning pinions made of S.A.E. 1045 steel at the Farm Implements Division of International Harvester boosted production per tool arind some 300 per cent.

By replacing the original motors on some of the machines with the larger new ones, we were in many cases able to operate satisfactorily at the higher machining speeds which are attainable through the use of carbide cutting tools. This not only increased production but in many instances also resulted in better surface finish. It also enabled operators to maintain closer tolerances on workpieces.

Where there was not sufficient rigidity in the machines to run them at higher cutting speeds without chatter or tool breakage, we added steadyrests to hold the workpiece more firmly. In addition, heavier tool blocks were substituted where needed.

We were even able to reclaim several old engine lathes from the plant scrap yard after equipping them with anti-friction bearings, hydraulic feed units, and making various other changes. These machines now perform quite adequately with carbide tooling.

Centralized stock control together with a centralized brazing and grinding set-up was provided to give us a quick and smooth flow of tools from

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toolroom to machine, thus minimizing the amount of down time required for changing tools.

Machining operations performed with carbides in the production of cream separators include the turning, milling, and boring of steel, gray iron, bronze, and various types of stainless steels. All of these materials — even the most troublesome of the stainless steels — are being cut today with carbide tools. Considerable stainless is used in these assemblies.

Typical of our stainless steel operations, for instance, is turning the counterbore in bowl shells made of No. 410 stainless, as shown in Fig. 1. With previously used tools this particular job had always been a shop headache due to the difficulty experienced in holding the counterbore round. When a Sundstrand "Model A-8" was tooled up with carbides, it was found that the problem could be effectively solved by stepping up the cutting speed from the 300 s.f.p.m. formerly used to 1200 s.f. This increased speed not only makes it possible to hold the counterbore tolerance but also gives a surface of a high degree of smoothness and has multiplied the daily output of bowls.

Another typical example of more effective steel turning through use of carbides is the rough turning of pinions made from S.A.E. 1045 steel on a high speed lathe. A view of this rough turning operation is shown in Fig. 2. Cutting speed with carbides on this job is 480 s.f.p.m. (2,800 r.p.m.). Feed is 0.012 inch per revolution with a depth of cut of $\frac{1}{2}$ 8 inch. Under these machining conditions, we are able to obtain as many as 300 units before tool sharpening becomes necessary.

Milling of the motor-drive opening, bowl base housing, and supply can from the gray iron main frames can be regarded as typical of our experiences with carbide milling. Previously, this particular operation had been so slow as to form a serious bottleneck. In-



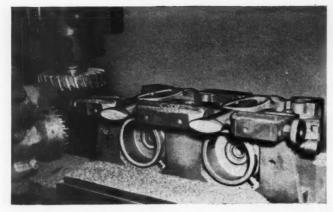


Fig. 3—Use of carbide tipped cutters for milling off the motor-drive opening, bowl base housing, and supply can from the gray iron main frames enabled the Farm Implements Division to triple its daily output of frames — from an average of 50 to 150. Average production between grinds has increased from 225 to 4.500 frames.

milling machine has been increased from 2% inch per

minute to 7 inches per minute, with a 3/32-inch depth of cut.

As mentioned, the use of carbides has been instrumental in the elimination of certain costly machining operations. Finish turning of spindle forgings made from No. 1144 steel is done

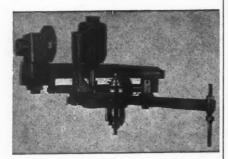
stalling carbide tipped cutters in the Newton planer-type three-headed milling machine for this work as shown in Fig. 3 has tripled the daily output of frames. Average production between grinds has increased from 225 to 4,500 frames. Table travel on this particular





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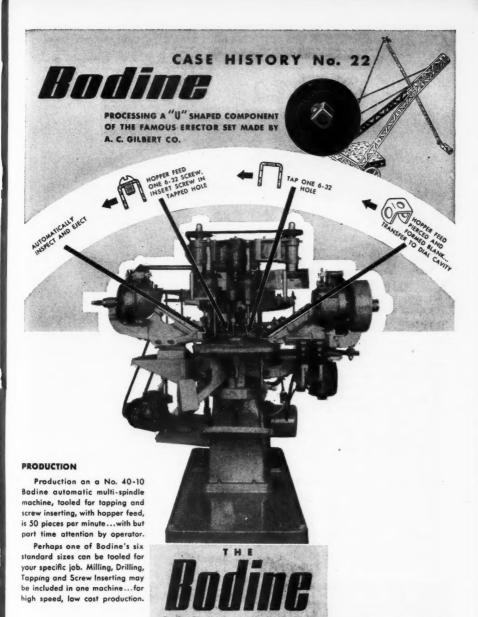
in one cut, the finishing obtained with carbides being such as to make unnecessary formerly needed slow and costly grinding. Cutting speed in this case is 520 s.f.p.m. (2,800 r.p.m.) feed is 0.012 inch per revolution; and depth of cut ranges between 3/32 inch and $\frac{1}{10}$ inch.

This particular turning operation is of even greater interest, since, being unable to obtain a new machine for this purpose, we were forced to salvage a 1905 lathe from our junk yard. We removed the cone pulleys; made a spindle; installed anti-friction bearings; made and installed steady-rests and new tool blocks; and replaced the drive gears with a hydraulic unit to drive the carriage. This reconstructed lathe is performing with remarkable efficiency.

Another example of eliminating machining operations occurred in the roughing and finishing of stainless steel bottom discs. These bottom discs for our cream separators must be held to close tolerances in order to prevent the milk and cream from mixing in the completed separators. An excellent surface must also be maintained on these parts to facilitate cleaning by the users. Use of carbide tools has made it possible to rough and finish these units in a single cut. The Carboloy tools also hold dimensions within critical limits; produce a remarkable fine surface finish; and have materially boosted the output of these parts.

As to the use of fewer machines, an example may be found in the production of bronze gears. Before retooling with carbides it had been necessary to use a four-machine battery—one automatic and three engine lathes—to take care of the production. Now, a two-spindle carbide tooled P & J consistently equals the production of the previous battery, thus eliminating three machines.

Bowl bases made from No. 330 stainless were formerly roughed on two maTap



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Boring Tools • Centers • Counterpores • Spotfacers • Cut-Off Tools • Drills • End Mills • Fly Cutters • Tool Bits • Milling Cutters • Reamers Roller Turning Tools • Special Bits chines and finished on two others. By adding larger motors and retooling with carbides, it was possible to increase the cutting speeds to such a point—550 s.f.p.m.—that the same output of bowl bases is now being obtained from two machines, one for roughing and one for finishing. The feeds on the No. 12 Gisholts used on

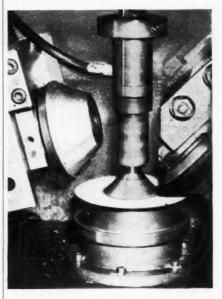


Fig. 4—This roll for spinning cone-shaped units for cream separators was "tipped" with Carboloy cemented carbide. Whereas the formerly used rolls wore out so rapidly that they had to be changed every other day, this carbide-protected roll has been in operation for more than 100 consecutive days.

this operation are 0.015 inch per revolution for roughing and 0.0045 inch for finishing.

Anc'er money-saving application of collection metal in the Farm Implements Division is a wear-resistant part for a spinning machine. Certain coneshaped units for our cream separators are produced by spinning a flat, stainless steel disc into the desired coneshape on a machine specifically design-

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ed for this purpose in our plant. A view of this operation is shown in Fig. 4. The "heart" of this spinning process is a solid metal roll having a truncated-cone shape. Originally, this roll was made of hard alloy bronze. The bronze roll, however, wore down so rapidly that it had to be replaced every other day. It also marred the stainless steel discs, causing excess scrap. A section of Carboloy cemented carbide was attached to the "business end" of the roll, i.e., where the excessive wear occurred. The roll has already been in operation for more than 100 consecutive days and shows no visible signs of wear.

An overall study of our cream separator operation—made some time after the retooling job had been completed—revealed that although fewer machines are being used now than before, total production of parts has more than doubled. Indicative of the economies

affected is the fact that in the machining alone of 50,000 spindles we have saved the entire cost of change-over to Carboloy tools.

Farrel Heavy Duty Roll Grinder for precision production in heavy roughing or fine finishing is the subject of a 28page bulletin issued by the Farrel-Birmingham Co., Inc., Dept. MMS, Ansonia, Conn. Of particular interest and practical value to engineers and operating men responsible for roll maintennace, the booklet provides a thorough description of machine features of design and construction. Included are tables presenting specifications, dimensions, and weights; a typical foundation plan; and cross-section views of the Farrel crowning and concave device, the spindle and wheelhead, and the beds, carriage, and neck rests. Among the illustrations are a double-spread pictorial index of design features, several installation views of different size machines, and numerous close-ups of various units of the machine. Copy of Bulletin No. 115 is available free upon request.

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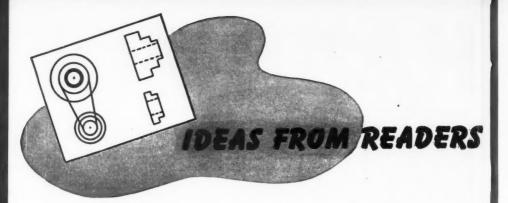
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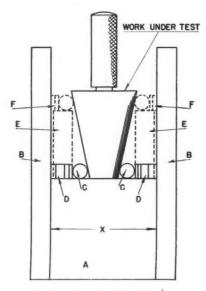
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Simplified Setup for Measuring Tapers

By R. RICHARDS

Many readers are undoubtedly familiar with the method of measuring tapers, for example with the aid of taper plug gages. The work is



Drawing of Simplified Setup for Measuring Tapers

placed in a vertical position and measurements are taken across pairs of rollers which have been butted against the work at two different heights. The difference between the two measurements together with the difference in height is considered a function of the taper.

The normal way of setting up the equipment for taking the measurements is to first locate the work on a surface plate and then place two rollers on the plate and hold them against the opposite sides of the work while measuring over them with a micrometer or other measuring tool. The rollers are then positioned on two equal packs of slip or block gages another measurement taken across another diameter of the work. The use of two loose rollers, two loose packs of block gages and a micrometer or vernier caliper is awkward. The device illustrated herewith has been designed to greatly simplify the process.

The device consists of a block A having a flat upper face and two side faces perfectly square to it and parallel to one another. Secured to the side faces are a pair of cheeks B, the inner faces of which are flat, so that the inner faces of the two cheeks are parallel to each other. The block is finished to a definite known width X.

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preferably an even number of inches or millimeters, and naturally the side cheeks B are then that distance apart.

To check a taper, the work is located on the block and a pair of rollers C placed in contact with it. Then slip gages D are packed between the rollers and the cheeks. It is an easy matter to find the diameter of the gage at the point of roller contact by subtracting from the distance X the diameters of the two rollers and the combined thickness of the two packs of gage blocks. Next, the rollers are located on a pair of equal packs of block gages E, and block gages F are inserted; the diameter of the taper at this new height can be obtained readily. Then it is an easy matter to compute the taper from the difference in the two diameters and the height of block gages E.

The decided advantage of this method of measuring tapers is that the loose gaging members are held to-

gether by the side cheeks. Using this taper tester cuts down very considerably the time required to check a taper when all the rollers and slip gages are free to move.

Light Stampings from Universal Pump Jig

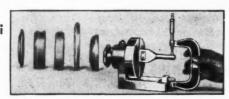
By Roger Isetts

CCASIONALLY in a small shop or in a toolroom it may be necessary to produce small quantities of light stampings for shims, gaskets, washers, and so on. Obviously, for small runs of from 50 to 300 pieces it would be a slow, tedious process to cut them by hand. However, to build a complete press die would not be feasible considering the shortness of the run and the cost of such a die.

A standard universal pump jig of a

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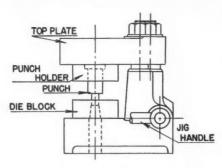
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type manufactured by a number of concerns can be utilized very nicely for performing this type of work. As



Sketch of Universal Pump Jig Setup for Light Stamping Operations

illustrated in the accompanying sketch, the punch is mounted in a holder and fastened to the jig top plate. The die block is screwed directly to the base. Removable punches and dies can be used to advantage if desired, permitting easy interchangeability in case similar jobs are required.

To operate the pump jig, all the toolmaker has to do is bear down on the jig handle. On heavy stock, a long section of pipe can be placed over the jig handle to provide for greater leverage.

Surprisingly enough, if proper clearances between punch and die are maintained accurate stampings cor-

rect to size and shape can be quickly made by this method. With a little ingenuity and imagination a great variety of light stampings of virtually any material can be fabricated in this manner.

Simple Method for Removing Broken Center Drill

By FRITZ L. KELLER

THE following method of removing a broken center drill point from a workpiece has been found highly successful on work which requires that the center drill be used to provide the correct location for the drill that is to follow, as is the general practice in most machine shops when holes are to be spaced accurately by the use of a vertical miller or its borer.

By this method, the remaining part of the broken center drill may be used to remove the broken part of the drill in the work after it has been reground to a shape of a boring tool as may be seen in the accompanying illustration.

The improvised boring tool is used to cut away the material around the broken drill point shown by dotted lines until the embedded point becomes loose enough to pull out with a plier or can be blown out with compressed air. This method of course is practical only where the drilled hole in the fin-

Pictured: a 24-Spindle Heavy-Duty Drill Head.

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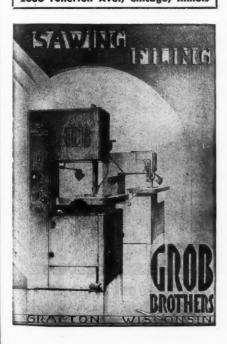
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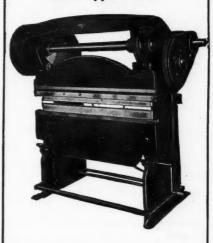
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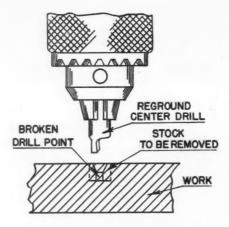
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Drawing Illustrating Simple Method for Removing Broken Center Drill

ished piece is to be larger in diameter than the hole which is "spotted" by the center drill. After the broken point is removed the correct size drill may then be used which will follow the exact location bored by the improvised boring tool without difficulty.

Holding Device for Coiled Spring Wire

By A. H. WAYCHOFF

BECAUSE of the normal tendency of spring wire to unwind after being wound into a coil it is often found difficult to handle. Usually, the coils of spring wire are received from the supply company neatly tied with rope or wire bands, and to remove any amount of the wire necessitates untieing the rope or cutting the wire bands. After a section of wire has been removed from the coil, the remaining spring wire must be retied. The holding device described and illustrated herewith was therefore devised to

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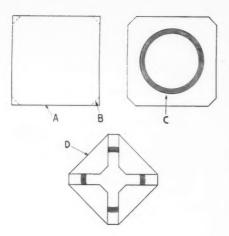
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RECISE 40

210 MODERN MACHINE SHOP





Drawing Illustrating Holding Device for Coiled Spring Wire

eliminate the need for tieing and untieing the coil each time a section of the wire is needed.

As shown at A, a square piece of sheet metal is required which is slightly larger in diameter than that of the coil. A small portion of each corner may then be cut off from the sheet metal square as shown at B. The coil of wire may then be placed on the sheet as shown at C and the corners folded over the coil as shown at D. By means of this device, as much wire as needed may be removed merely by grasping the end of the wire and pulling out the amount required. The remaining wire on the coil cannot straighten out or unwind. Tieing and untieing of the coil is eliminated and the wire is held safely until the last turn has been used.

Drewco Collet Chucks are fully illustrated and described as to function, features, advantages, and so on, in a fourpage two-color folder issued by the Drewco Corp., Dept. MMS, 1600 Junction Ave., Racine, Wis. Copy free upon request.



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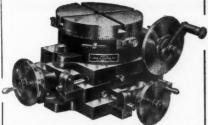
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News of the Industry

American Gear Manufacturers' Association Elects Officers

At the thirty-second annual meeting of the American Gear Manufacturers' Association held June 7, 8, and 9 at The Homestead, Hot Springs, Va., the following officers were elected for the coming year:

President, Walter L. Schneider, vice president, The Falk Corp., Milwaukee, Wis.; vice president, F. W. Walker, executive vice president, Philadelphia Gear Works, Philadelphia, Pa.; treasurer, Roger B. Salinger, president, Massachusetts Gear Co.; executive secretary, Newbold C. Goin. In addition to the new officers, new members elected to the executive committee were: John H. Flagg, president, Watson Flagg Machine Co., Inc., Paterson, N. J.; S. L. Crawshaw, manager engineering and sales, Pacific Gear and Tool Works, San Francisco, Calif.; Louis B. Bond, vice president and general manager, Christiana Machine Co., Philadelphia, Pa.; and Paul A. Manger,

chief engineer, Buffalo Division, Farrel-

Birmingham Co., Buffalo, N. Y. At the annual banquet held Tuesday evening William Hazlett Upson, wellknown for his humorous stories in the Saturday Evening Post, spoke on "What It Takes to Be A Salesman."

Among those who read papers or spoke on subjects pertaining to gear manufacturing was Dr. L. P. Tarasov, who spoke on "Some Factors Influencing the Quality of Ground Gears and Worms"; and George Wohlberg, U. S. Navy, who discussed "Gear Sounds."

The A.G.M.A. president, R. B. Tripp, delivered the opening address and D. T. MacCarthy, of the A.G.M.A. Staff, presented a statistical report. An engineering forum was held Tuesday morning at which S. L. Crawshaw served as moderator, with A. H. Candee, Paul Manger, L. D. Martin, R. E. Rawling, F. Richard, and C. R. Staub as members of the forum.

At the annual dinner Tuesday evening,



(Left)—Walter L. Schneider; (Right)— F. W. Walker; (Left to Right Below)— S. L. Crawshaw, John H. Flagg, Paul A. Manger, and Louis C. Martin





214







MODERN MACHINE SHOP

July, 1948

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Louis C. Martin, gear engineer, Eastman Kodak Co., was announced as the 1948 recipient of the Connell Award. The award was made to Mr. Martin for his valuable contributions to the gearing industry's knowledge and literature, particularly in the fine pitch gearing field. The Connell Award, which can be awarded annually by the American Gear Manufacturers' Association, was established by the Falk Corporation, Milwaukee, Wis., in commemoration of the company's late vice president, Edward P. Connell.

Ampco Twist Drill Corporation Purchased by Greenfield

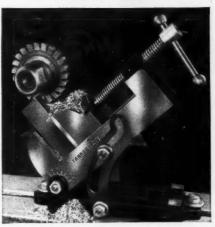
The Greenfield Tap and Die Corp., Greenfield, Mass., producer of taps, dies, and 'gages, has purchased the Ampco Twist Drill Corp., Jackson, Mich., manufacturer of twist drills, reamers, and end changes are planned in the sales or promills. According to D. G. Miller, president of the Greenfield Corporation, no duction departments of Ampco since the firm will continue to operate as a division of Greenfield. Frank J. Sikorovsky will continue as president and general manager of Ampco and has been elected a director of the Greenfield Tap and Die Corporation.

Sales Organization Formed for Distribution of Swiss Precision Machinery and Tools

The Hauser Machine Tool Corp., 74 Bournedale Rd., N., Manhasset, N. Y., has been formed for distribution in the U.S.A. of the precision machinery and tools of Henri Hauser Ltd., Bienne, Switzerland. President of the new firm is Carl Hirschmann, Bienne, Switzerland. Vice president and secretary is Gilbert L. Dannehower, M.E., Westfield, N. J., well known in the trade as former general manager in the U.S.A. for C. E. Johansson, Eskilstuna, Sweden. He also served as general sales manager for the Cosa Corporation selling Swiss jig boring machines, as well as plant manager during the war for the Swiss American Gear Company.

Treasurer of the Hauser Machine Tool Corporation is Walter A. Ryan, Royal Oak, Mich., well known as the former representative in Michigan and Ohio for SIP Swiss jig boring machines and measuring instruments. Paul Chatelain, Dayton, Ohio, is the representative for Hauser in the Dayton-Cincinnati area.

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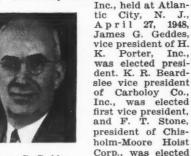
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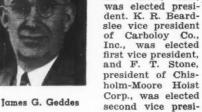
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James G. Geddes Elected President of American Supply and **Machinery Manufacturers**

At the meeting of the American Supply and Machinery Manufacturers Ass'n.,





dent. W. W. Kemphert, manager of Merchandise Division, Worthington Pump and Machinery Corp., was elected treasurer.

Mr. Geddes has been associated with H. K. Porter, Inc., Somerville, Mass., since 1919. He is chairman of the executive committee of American Hardware Manufacturer Ass'n. and first vice president of the American Hardware and Machinery Manufacturers Association.

Stephens Elected President of S C & H

J. J. Stephens, vice president, treasurer, and general manager of the Strong, Carlisle & Hammond Company since 1940, has been elected president of the firm, according to an announcement made by C. Russell Feldman, chairman of the board of directors. He was also reelected treasurer.

A native Clevelander, Mr. Stephens has been associated with Strong, Carlisle & Hammond for 44 years. He succeeds G. J. Zimmerman who retired last December. Mr. Stephens attended South High School and in 1904 started with S C & H as a bookkeeper. He became office manager in 1915 and four year later assumed the duties of cashier and credit manager. In 1923 he was named assistant treasurer and the following year was elected to the board of directors. He served as secretary of the firm from 1925 to 1932 and in 1933 was named treasurer.

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American Welding Society Announces the A. F. Davis Undergraduate Welding Award

To stimulate undergraduate interest in welding, funds have been donated to the American Welding Society, 33 West 39th Street, Now York 18, New Yory, for the A. F. Davis Undergraduate Welding Award. This award will consist of four cash prizes given annually to authors and publications for the best and second best articles on welding published in undergraduate magazines or papers during the preceding year. Any undergraduate of a college or university in the United States or Canada is eligible, but the paper must be published in an undergraduate publication.

The A. F. Davis Undergraduate Welding Award is named for its donor, A. F. Davis, Vice-president and secretary of the Lincoln Electric Company, Cleveland, Ohio. Conditions of the A. F. Davis Undergraduate Welding Award Program

are as follows:

Purpose—To encourage and stimulate interest in welding through the preparation of articles on the subject of welding by undergraduate students, and dissemination of such information through undergraduate publications (papers and magazines).

Awards—The awards will be as follows: \$200.00 to the Author of the best paper

\$200.00 to the Publication

\$150.00 to the Author of the second best paper

\$150.00 to the Publication

A suitable certificate will be given to each author and publication receiving awards. In case of joint authorship, the author award shall be given jointly; however, certificates will be issued to each author.

Subject—Subject matter of the paper may be on any phase of any type of welding or its application to design and con-

struction.

Eligibility—Any undergraduate of any college or university, in the United States, its possessions, or Canada is eligible. The paper must be published in an undergraduate publication in the interval between April 1, 1948 and April 1, 1949. Six copies of the publication must be received at the office of the American Welding Society, 33 West 39th Street, New York 18, New York, before 5 p.m., April 10, 1949, marked to the attention of the Chairman of the Educational Committee.

Judging-The judging group shall be



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Saw Specialists Exclusively for Over 70 Years New Haven 5, Connecticut, U.S.A. selected by the Educational Committee of the American Welding Society. The judging shall be based on the originality and clarity of presentation and the thoroughness with which the subject is presented. The decision of the judges will be final.

Announcement—The persons and publications to receive awards will be notified by mail on May 15, 1949. An announcement of the award winners will be made in the next regular issue of the Welding Journal and the awards will be presented at the Annual Meeting of the American Welding Society.

Name—The awards are to be known as the "A. F. Davis Undergraduate Weld-

ing Awards."

Did You Know?---

Lovejoy Tool Co., Inc., Springfield, Vt., has announced the appointment of William H. Jones, 47 W. Winona Ave., Norwood, Pa., as its exclusive representative in the Eastern Pennsylvania and New Jersey territory.

On July 1, 1948, the Jeffreys Engineering & Equipment Company, a firm devoted to the sales and engineering of metal-working equipment and machine tools, formerly located in the Odd Fellows Bldg., Raleigh, N. C., moved its offices to the Guilford Bldg., Greensboro, North Carolina.

The Waltham Grinding Wheel Co., Waltham 54, Mass., has announced a relocation of its Detroit factory branch at 1433 East Eight Mile Road, Hazel Park, Michigan, under the management of Walter W. Hayden.

Tri-State Products Co., Toledo, Ohio, has been appointed exclusive distributor of Marshall ground flat stock in the tristate area surrounding Toledo by the Marshall Steel Co., Chicago, Illinois.

Cosa Corp., 405 Lexington Ave., New York 17, N. Y., representative in the United States for many Swiss manufacturers of high precision machine tools and measuring instruments, will represent many of these same firms in Canada, such as Andre Bechler, Moutier, Switzerland; Friedrich Gygi, Lengnau b. Biel, Switzerland; Societe Genevoise D'Indstruments de Physique, Geneva, Switzerland; and Sallaz Freres, Grenchen, Switzerland. The sales efforts for Canada will be directed by Milton D. Thalberg, sales manager for Cosa.



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Did You Know?---

William W. Criswell, Jr. has been appointed sales representative, with offices in New York City, for the American Wheelabrator & Equipment Corp., Mishawaka, Indiana.

Federal Tool and Manufacturing Co., Minneapolis, Minn., manufacturer of short run stampings, has moved into a recently completed modern plant located at 3600 Alabama, St. Louis Park, Minneapolis 16, Minnesota.

H. C. Hook Co., Worcester, Mass., has been appointed sales representative for the Nilsson Gage Co., Inc., Poughkeep-sie, N. Y., in the states of Maine, New Hampshire, Vermont, Rhode Island, and Massachusetts. Homer L. Lacock has been named representative in the Buffalo and Rochester area of New York State.

According to an announcement made by John Ireland, sales manager, Sapphire Products Division, Elgin National Watch Co., 932 Benton St., Aurora, Ill., Harold H. Martin has been appointed district representative for Elgin in the State of Wisconsin, and Chris Wagner will represent Elgin in the Southern California area.

The Koehler-Pasmore Co., 11833 Hamilton Ave., Detroit 3, Mich., has been appointed sales representative in the entire state of Michigan for the Alpha Solder line, according to an announcement made by M. A. Boyle, sales manager of Alpha Metals, Inc., Brooklyn, New York.

The TOCCO Division of The Ohio Crankshaft Co., Cleveland, Ohio, has announced the opening of new offices in Detroit where complete engineering, sales, and service facilities will be available covering all phases of induction heating.

sli

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The Allison Co., Bridgeport, Conn., manufacturer of abrasive cutting wheels, has announced three personnel changes affecting the service and sales departments of the company, Grant J. Casserly, appointed to head the machine service department, will supervise installation of new abrasive cut-off machines and service machines already in operation. Harold R. Powell has been transferred from the research laboratory to the sales department to assist H. Robert Powell, vice president and sales manager. Edward C. Scanlon, formerly the Allison Company field engineer in Northern New York State, has been transferred to the New Jersey territory.



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A precision tool for testing and checking parts between centers. Both heads adjustable, locked in place by lever-operated clamps. Work is held between one fixed center while spring loaded retractable center clamps work in position. Dial indicator with adjustable holder available as extra equipment.

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Did You Know?---

The Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill., has announced the appointment of the Jack J. Kolberg Co., 1305 Dexter Ave., Seattle 9, Wash., as its representative for the Hannifin line of hydraulic and pneumatic power and production equipment in the states of Washington, Oregon, and Idaho.

Littleton C. Barkley has been appointed general sales manager, Asbestos and Rubber Products, West Coast Division, Raybestos-Manhattan, Inc., according to an announcement by the corporation's Passaic, New Jersey, offices.

H. A. Powis, president of the Reypo Corporation, Los Angeles, has announced the recent consolidation of the main office and factory in a new building at 5751 West 98th Street, Los Angeles 45, California.

Farrel-Birmingham Co., Inc., Ansonia, Connecticut, and Buffalo, New York, announces the appointment of Paul R. Oliver as West Coast manager, with headquarters at the company's office, 2039 Santa Fe Avenue, Los Angeles.

Thomas E. Hoffman, retired executive of John H. Graham & Co., Inc., New York, died on May 12 at the age of 78. Before retiring ten years ago, Mr. Hoffman was connected with John H. Graham & Co., Inc. for 47 years and was vice president of the organization.

Bakhshi Ram & Co., Ahmed Bldg., 129 Modi St., Fort Bombay, India, with 28 years of experience in Indian markets, desires to contact American manufacturers of builders' hardware, carpenters' tools, general hardware, and small tools of all kinds for distribution in India. This firm is interested primarily in contacting manufacturers.

Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles, Calif., manufacturer of open back inclinable punch presses and milling machines, has purchased the complete line of Parker power shears and Multi-Max punch presses previously manufactured by the Parker Manufacturing Co., Santa Monica, California.

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The extra tough, shock-resistant, Carboloy standard tool in this turret lathe removes more than five tons of chips from steel forgings per tool grind . . . and steps up production to three times the former output.

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So, whether your job calls for any of Carboloy's 600 standard tools or blanks, or for a special Carboloy-tipped tool (available through over 150 tool manufacturers)—ask your Carboloy man to call on you. Write for your copy of Carboloy's Catalog GT-200, too. Carboloy Company, Inc., 11143 E. 8 Mile Road, Detroit 32, Mich.

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Cross Transfer-matic for Automotive Cylinder Blocks

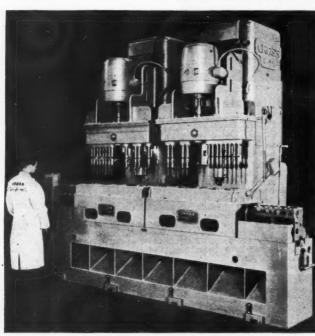
A unique special machine tool which provides for four finishing operations on automotive cylinder blocks has been developed by The Cross Co., Dept. MMS, Detroit, Mich. The machine is a Transfer-matic—Cross' name for its special

machine tools equipped with continuous automatic material handling devices and is designed to permit maximum production with a minimum of physical and mental effort on the part of the operator.

A total of 64 pieces per hour are claimed to be finished with the machine at 80 per cent efficiency. Four cylinder blocks are cut at one time progressively. At the

first station, eight valve guide bushings are rough reamed; at station two, four exhaust valve insert parts are counterbored; at the third station, four intake valve seats are formed; and, at the fourth station, the eight valve guide bushings are finishreamed.

Outstanding mechanical features of the Transfermatic include a single lever cycle control, hardened and ground steel ways, hydraulic feed, rapid traverse, and simplified maintenance through the extensive use of duplicate standard Cross units. Con-



Cross Transfer-matic for Automotive Cylinder Blocks

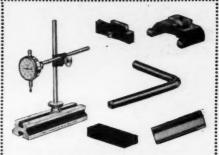
GOOD WAYS TO SIMPLIFY O CHECKING

Each of these STARRETT Dial Test Indicators has many excellent features. Each is adaptable to a wide range of inspecting and comparing jobs. Ask your Starrett Tool Distributor about them ... or write for Starrett Dial Indicator Catalog, "MD."



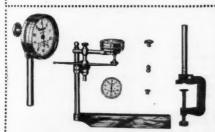
"LAST WORD" INDICATOR No. 711-F

has reversible action, swiveling body, detachable ratchet joint contact point—graduated .001*, reading 0-15-0, range .030" Can be used in tool post with universal shank or clamped to height gage.



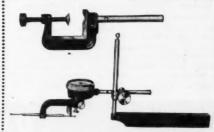
DIAL TEST INDICATOR No. 665

A sturdy combination for inspectors, machinists and toolmakers. Attachments providing for infinite adjustment include horizontal and right angle arm, tool post holder, keyway and guide stops. Choice of dial indi-



UNIVERSAL DIAL TEST INDICATOR No. 196

Simple, reliable, sensitive, easy to read, easy to set up and use—that's what makes STARRETT Dial Test Indicator No. 196 a favorite with toolmakers, machinists and inspectors. Many special attachments provide for universal application to all classes of work. Dial graduated .001", reading 0-100, range .200" Also available to read 0-50-0, 0-20-0 and 0-40 by thousandths, range .200".



HEAVY DUTY DIAL TEST INDICATOR No. 645

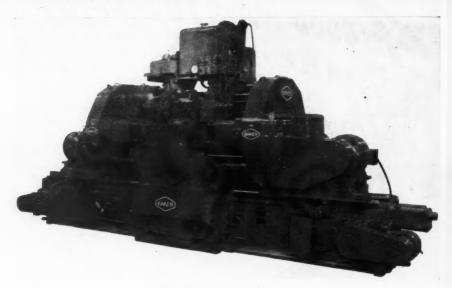
For severe applications around machinery or for continuous use in general tool work, No. 645 has a special, spiral-type mechanism of unusually rugged construction. Combines sensitive, accurate action with easy-to-read dial.

Dial reads 0-50-0 and can also be supplied with 0-100

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Baker Multi-Operation Machine

veyor connections are provided for transporting parts up to the machine and for conveying finished pieces away. Transfer, locating, and clamping operations are all effected by automatic power.

Baker Multi-Operation Machine

Drilling, boring, reaming, counterboring, and tapping operations on automobile front wheel spindle supports are performed on a 6-station multi-operation machine produced by Baker Bros., Inc., Dept. MMS, Toledo, Ohio. The machine is equipped with an automatic power indexing trunnion for transferring the

parts from the loading station through the five machining stations. Correct location at each of the indexing stations is provided first by a shot pin and then by guide bars which move in with the right and left head units. Clamping and unclamping of one right and one left-hand part at each station are effected through the use of a separate hydraulically operated unit.

Components of the machine include two standard Baker Model $3\frac{1}{2}$ x 24 floor type hydraulic feed units located to the right and left of the indexing trunnion. These units have saddles mounted on round $3\frac{1}{2}$ -inch diameter Nitralloy bars, providing maximum accuracy with minimum wear in heavy duty applications. The saddles

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in grinding threads with the correct degree of hardness, providing a cutting edge that insures maximum performance and minire en neered - right mum wear.

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GROUND THREAD TAPS

INTERNAL MICROMETERS

travel on X-alloy bushings and include master driver boxes for pot-head installation of mulitple saddles. The master driver boxes are mounted on standard Model 3½ x 24 drive brackets having drive through V-belts and pick-off speed change gearing to the master driver boxes and spindles. The spindles are mounted on ball bearings and driven through shaved and flame hardened gearing mounted on hardened steel shafts. Gearboxes and multiple heads are arranged with self-contained lubricant pumps for cascade lubrication.

An auxiliary Model 3 x 12 hydraulic feed unit, equipped with a 4-spindle head, and an auxiliary 4-spindle tapping unit are mounted to the rear of the trunnion for tap drilling and tapping four small cross holes. The tap unit is mounted on a feeding saddle with air cylinder for rapid advance and return, thus allowing the unit to clear the trunnion for indexing. Hydraulic feed power for the auxiliary 3 x 12 is supplied by a Baker hydraulic power pack located outside the machine base. This power pack, mounted on casters and provided with self-sealing couplings for rapid exchangeability, utilizes an Oilgear Type J.K. pump for hydraulic feed.

Natco "Holesteel" Model C Type B Multi-Spindle Driller and Tapper

The National Automatic Tool Co., Inc., Dept. 27, Richmond, Ind., announces an adjustable multi-spindle driller and tapper which is available in three models designated as the Natco "Holesteel" Models C2B, C3B, and C4B. All models are equipped with electrically controlled hydraulic feed systems, providing infinite feed range and pick-off type change gears to permit a wide selection of spin-

dle speeds.

Each model can be supplied with either of two bases which are similar except for the size of the working area. The small area base is supplied for adjustable table applications or for stationary fixtures mounted on the base. The larger area base is suitable for rotating and sliding type fixture applications. Across the front and along either side of the working area is a wide and deep coolant channel which drains the coolant into a reservoir within the rear section of the base.

The Models C2B and C3B can be supplied with adjustable knee type work tables. The working area of the table top is surrounded by a wide coolant channel



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PUNCH PRESSES

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Famco foot-operated shears dog precision shearing of up to 18 gauge mild steel. Come in 5 cutting widths (22' to 52')... have easy-to-set gauges.



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FAMCO MACHINE CO.

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which drains to the machine base. The knee supporting the table has long bearings on the ways of the column. The entire assembly has a vertical adjustment of approximately 12 inches through a crank-operated elevating screw. A heavy box section column is said to prevent deflection under the heavy thrust loads encountered. The column ways are of close grain high tensile strength cast iron. Hardened and ground steel ways can be furnished on order.

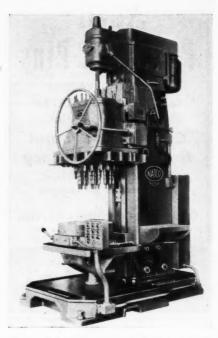
The upper section of the column forms a compartment which encloses the hydraulic pressure pumps and all of the hy-



This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre...at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. $4\times36\frac{1}{4}$ band. The ideal portable unit.

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Natco "Holesteel" Model C2B Multi-Spindle Driller and Tapper

draulic system piping. The hydraulic feed control panel is located on the right side of the compartment, while on the left side is located an inspection cover and a protected oil filler opening. The lower section of the column encloses the head counterbalancing weight. Additional auxiliary counterweights may be added through an opening in the column rear wall.

The neck of the Natco Holesteel Model

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Handles many odd size tool room and production jobs, due to its capacity of 8" x 12" x 12". Actual povements — Transverse 83/4" — Longitudinal 13" — Vertical 12" (under 7" wheel).



Model SG

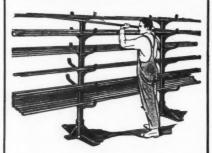
A sensitive, highly accurate machine specially designed "for the job that fits in your palm."
Actual movements — Transverse 4" — Longitudinal 8"—Vertical 6" (under 4" wheel).

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Each BROWN SECTIONAL RACK combines five major and several minor features of design, all of which save money for its owner. The time previously lost in end-hauling each bar of stock its entire length from the old-style, closed-side Rack is saved by the Brown Rack which requires but a few inches of side movement.



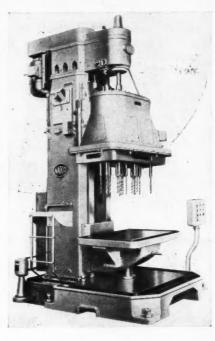
Each length, width and thickness of stock is displayed in Gold-Fish visibility for instant selection and workmen waiting for stock are served without waste of time. The BROWN SECTIONAL RACK is a simple, durable article built in five styles from standard inter-locking metal sections. It cannot burn, sag or twist; unattached to the building, it can be moved at will. Changes in length of stock can be met by moving the units nearer or further apart, while increases of stock can be met by simply adding more standard units. Built from metal thruout, depreciation is practically nil. SEND FOR BULLETIN 26-M.

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C Type B Multi-Spindle Driller and Tapper is an anti-friction cascade lubricated gear chest driven by V-belts from a footmounted vertical motor. The neck drives both the adjustable spindle head and the hydraulic pressure pump. The sliding spline head drive shaft telescopes in the neck drive sleeve, which is driven by pick-off change gears located in the upper front portion of the neck. A shift lever located on the right side is used in



Natco "Holesteel" Model C3B Multi-Spindle Driller and Tapper

operating a sliding gear which provides a 2.5 to 1 gear change and a neutral position, thus permitting stopping of the head drive shaft for set-up purposes. Anti-friction mounted sprockets over which two wide roller chains pass support the counterweighting.

The adjustable spindle heads are of anti-friction mount construction, which each spindle drive has independent spindle speed change gears that provide high, low, and neutral changes. A cascade system is employed to lubricate the head. Guide ways of ample length slide on the column ways and are pressure lu-

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ADVANCE CLAMPS Cut Set-Up Time 75%

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Dependable Accuracy.

Ample Adjustment For Spindle Run-Out. For Drill Presses. Lathes, Mills.

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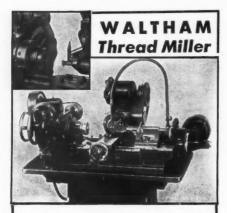
Bulletin M-12.

CENTER SCOPE PRODUCTS 3829 San Fernando Rd., Glendale 4, Calif.

This EVANS adjustable CHUCKING REAMER ASKS NO FAVORS ream a smooth finish in one operation, even when finishing holes with keyways, slots or grooves. Straight line expansion prevents springing or stressing of blades—allows use of full expansion range. Wear is evenly distributed . . . operation is smoother and faster...blades last longer. Write today for full information and prices. EVANS REAMER AND MACHINE CO.

bricated at each cycle of the head. A T-slotted head flange is used to mount both the adjustable spindle arms and slip spindle plates. The spindles are driven by universal joints of the hardened and ground solid trunnion type and may be located in any position within the area of the head and a drive angle of 35 degrees or less. A vertical adjustment of 2 inches is provided to compensate for tool wear or difference in length. Fine adjustment through a screw allows for facing and depth setting with accuracy.

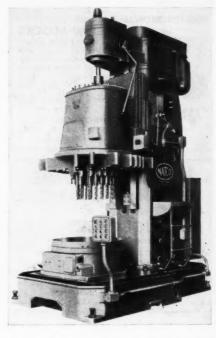
The slip spindle plates used in conjunction with the multiple head drives



Pinion and Gear Cutting Machine, Thread
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WALTHAM MACHINE WORKS WALTHAM MASS.



Natco ''Holesteel'' Model C4B Multi-Spindle Driller and Tapper

are said to be advantageous for high production small-lot jobs. Several plates may be used or in some cases a single plate may be bored for several hole patterns. The positive location and alignment of the spindles is a feature of the slip spindle plate construction.

A tapping attachment can be added, consisting of a manual head feed arrangement which works in conjunction

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S TEEN High-Speed pipe, tube and column cut-off machines embody unique design and rigid construction features to greatly step up cut-off operations. Available in three sizes to cut diameters ½" to 3"; ½" to 6"; 3" to 12".

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- Economical—cost no more than ordinary feeders—available in non-marring bronze.

SUTTON TOOL COMPANY STURGIS, MICHIGAN

SUTTON COLLETS

with an electrical reversing control to the head motor. A manually operable handwheel located convenient for the operator is used to traverse the head which includes a travel limit dog operating a limit switch for cycle control. Floating tap holders permit different lead

taps to be used in one setup.

A head traverse power cylinder is mounted between the ways at the top of the column and, through a control system, provides a cycle sequence of rapid advance, coarse feed, fine feed, rapid reverse, and stop. The control panel includes a directional control, feed rate control, pressure gage, pump relief valves for pressure control, and solenoids for electrical remote control. Gasket mounting allows installation with piping concealed within the machine and permits easy maintenance. Two independent infinitely variable feed apertures control the feeds through a specified range. Working in conjunction with the feed aperture, a feed governor is said to maintain the selected feed rate regardless of fluctuation in the tool resistance, change in hydraulic pressure, or break through of the tools.

A step drilling attachment can be furnished which allows for the drilling of deep holes by increments of depth with-

in a completely automatic cycle. A remote control for set-up use also can be furnished. This control provides full remote control through push buttons for all phases of the cycle—rapid advance, coarse feed, fine feed, and rapid reverse. A motor-driven centrifugal coolant pump mounted on the left rear of the base provides coolant when required. Electrical equipment furnished with the machine is in accordance with National Machine Tool Builders' Electrical Standards. Equipment for special power supplies also can be furnished.

Davis & Thompson Model VSI 8-Station Indexing Type Machine

The Davis & Thompson Co., Dept. MMS, 6411 W. Burnham St., Milwaukee 14, Wis., announces a multiple-operation 8-station indexing type machine, designated as the Model VSI, which is adaptable to a wide range of metal-working operations. The machine as shown in the accompanying illustration is arranged to drill, ream, and chamfer a 1.281-inch hole and saw a slot in both ends of a front suspension spindle support arm.

The work circle of the machine is 80





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ACCURACY

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Machine Keys

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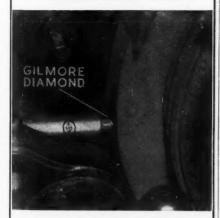
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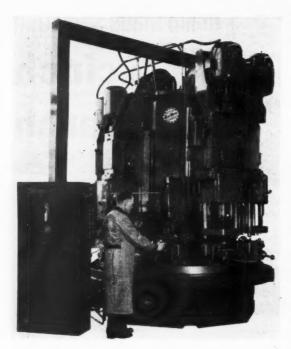
You'll see the name of the blade you want to use — hand, power or band saw — opposite the type of material you want to cut. You'll see this valuable information quickly, easily, when you tack the new Victor wall chart over your tool crib or in your machine shop.

What's more you'll get a lot of inside tips on how to get longer life, the best use, from every blade... There are plenty of ways to cut costs, make money, on this new Victor Wall Chart... It's printed clearly, attractively, and it's yours

absolutely FREE.

Drop in on your Victor supplier — or send him a card today. The supply is limited. Also see him the next time you want the finest in cutting performance. He carries a full line of Victor blades — one for every job a hack saw or a band saw can do. Victor blades cut better, too, on metals, plastics, and other non-metallics...cut faster, cleaner, last longer.





inches with an 88 inch diameter table. The work is mounted on a ball bearing race having an external micro adjustment for table clearance. Indexing of the table is accomplished hydraulically through a fluid motor and worm and worm wheel. The hydraulic oil reservoir is located in the base of the machine. The drill heads are individually counterbalanced units which are hydraulically operated for rapid advance, feed, and rapid return. An auxiliary coolant system can be added when required. The de-

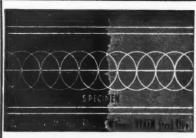
sign of the column is such that the number of stations required for a specific job can be provided. An electrical system provides complete operator control for both manual and automatic cycling of the machine.

Where long workpieces, such as flanged automobile axles, require a higher table so that operations can be performed on the ends, a table of the proper height can be furnished. A chip trough provided around the machine enables chips to be removed at a central point through the use of an automatic chip scraper. The ma-

chine is approximately 9 feet in diameter x 15 feet high and weighs 63,000 pounds.

Agnew Type HCP3-5 Special Hydraulic Assembling Press

Identified as the Type HCP3-5, a special hydraulic assembling press for onepiece spark plugs that can also be adapted to progressive welding and forming



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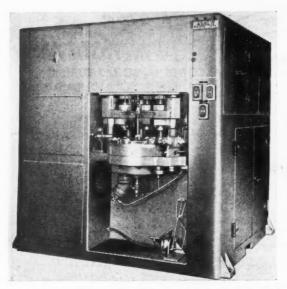
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PIPE BENDING MACHINE
Company INC.



Illustrated is the Series "AG" 20/40" Extension Bed Gap Lathe. Also made in 28/50" Heavy Duty. The Extension Bed Gap Lathe is designed to be used either as a gap lathe or an engine lathe.

We also manufacture a line of regular geared head engine lathes.

me lathes. Write for circulars.



operations is announced by the Agnew Electric Co., Milford, Mich. All sequencing operations are performed hydrauliAgnew Type HCP3-5 Special Hydraulic Assembling Press

cally, thus eliminating any possibility of the machine getting out of proper sequence, it is claimed.

The Agnew Type HCP3-5 Press incorporates a table having six stations which can be indexed to 60 deg. by means of a hydraulic motor. The speed of acceleration and deceleration of indexing is adjustable by means of a flow valve through infinite steps. Individual pressure adjustment for each of the three rams is provided, and pressures up to 8 tons are obtainable. The machine is arranged to operate as long as the foot control is depressed; however, when the foot pedal is released, all three rams immediately return to their up position and the machine stops.

The crossheads of the machine have replaceable bushings and operate on hardened and ground large diameter guides,

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FLOORS slope to feed parts to front—end reaching and fumbling.

Bins taper toward front to form convenient semicircle—keep all bins within easy reach. Stacking, locking construction for rigid set-

ups, easily changed when necessary.

All-welded construction. Smooth, folded edges. New-design, adjustable hoppers provide increased capacity and permit regulated flow of parts according to sizes and weights.

Two sizes-tapered or straight sides.

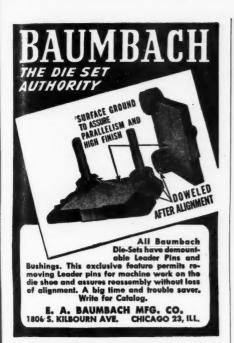
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DESCRIPTIVE CATALOG
No. 8





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LASTING PRECISION ALIGNMENT **ELIMINATE BINDING and CHATTER** ZERO SHAKE or PLAY LOW FRICTION and WEAR LONG LIFE - LOW MAINTENANCE SOLVES SLIDING LUBRICATION PROBLEMS

Now available for 1/4". 1/2". 1/4" and I' shaft diameters. Additional sizes to follow. Write for literature and name of our represen tative in your city. No obligation, of course

THOMSON INDUS DEPT. D. MANHASSET. N. Y.

FRICTION COSTS MONEY ROLL IT

DON'T SLIDE IT

two of which are provided for each crosshead. The machine construction includes a sturdy fabricated frame with oil tank in the base having cover plates for the inspection of the pump, filters, and so on. All hydraulic controls are isolated from electrical components and conveniently grouped for easy adjustment. The use of surface-mounted valves provides for quick servicing and enables all pressure lines to be located inside the oil tank, thus eliminating leakage of oil on the outside of the machine. Automatic oil temperature control is provided for maintaining the proper operating temperature of hydraulic oil, valves, and so on.

Additional features of the machine include a 15 h.p. motor, which drives a double volume pump to provide fast ram speeds and pressures up to 1,000 p.s.i.; water cooling to dies, punches, transformer, punch holder, and so on; electrical controls which are readily adjustable at the front of the machine; elcctronic control of heat and pressure functions: and flush - mounted disconnect switches. The machine weighs 10,000 lb. and occupies a floor space of 60 x 60 x 60

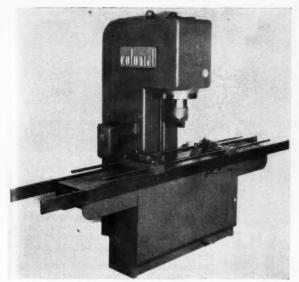
inches high.

Colonial PS-75-12 Hydraulic Straightening Press

A 75-ton model designated as the PS-75-12 has been added to the line of 15, 20, 35, and 50-ton hydraulic straightening presses offered by the Colonial Broach Co., P. O. Box 37, Harper Station, Detroit, Mich. Designed for handling both finished and rough work, the machine employs a double rail straightening fixture to accommodate the larger and heavier work for which this high capacity press is intended.

Rugged reinforced welded steel construction is used for the open side frame design. Motors are built-in. The rams are direct acting from high capacity hydraulic cylinders mounted in the head, and are available with bronze ram noses in place of the standard steel design, if desired. The same is true of work support anvils. Work supports may be either of the center or roller type, depending on the nature of the work to be handled. Guide rails are extra long to prevent sagging of long work beyond the work anvils.

Standard equipment of the Colonial PS-75-12 Hydraulic Straightening Press includes hand controls and a pressure gage. Foot pedal operation can be provided on special order. The machine ocin ra



cupies a floor space of 54 x 140 inches, including the straightening fixture. The ram has a maximum length of stroke of

Colonial PS-75-12 Hydraulic Straightening Press

12 inches, with a power stroke speed of 45 inches per minute and a return speed of twice this amount. The hydraulic system is operated through a 15 h.p. 1,800 r.p.m. motor.

Grieder Tube Cut-Off Machine

Said to cut any diameter or wall thickness of tubing within its range in less than ½ second per cut, the Grieder Tube Cut-Off Machine illustrated herewith is now being introduced by the Grieder Machine Tool & Die Co., Dept. MMS, 324 N.

Maple St., Bowling Green, Ohio. According to the manufacturer, the machine is designed to cut pieces accurately to

A BETTER BORING BAR

OUR fine list of Customers is PROOF that our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life especially with tungsten Carbide. We also make bars for our Type B and Type C cutters or a combination of tool bits and cutters. Bars are made to suit customers' requirements as to method of drive, pilot, number of holes, angle of bit, etc. Our two-bladed cutters can be floated in the bar or held rigidly. Cutters are interchangeable—hence can be ground in an arbor in the tool room and only require a few seconds for inserting in the bar.

Square hole sizes range from 1/4" up to and including 3/4".

THE DETROIT BORING BAR CO. 688 E. FORT ST. Detroit 26, Mich.



1927

TYPE "B" AND "C" CUTTERS

Suitable for Tipping With Tungsten Carbide



By A strong rigid serrated 2-bladed cutter—located in the bar with a taper pin. Bores holes accurately to close limits. Can be expanded and reground giving long life. Sizes 1/2" dia. up to 6".



"(')" A simple 2-bladed reaming cutter. Can be expanded and reground. Located in the bar by a hardened V. This V never has to be reground as blades are expanded.





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length with a minimum of burr and without any distortion to the tube.

The Grieder Tube Cut-Off Machine is claimed to provide 12,000 cuts per hour, the cutting time for various sizes, shapes, and wall thicknesses being the same. In-

terchangeable dies allow for changeover from one diameter to another in a minimum of time. Designed for either fully automatic or manual operation, the machine can be used to cut various shapes of tubes. such as round. square, rectangular, hexagon, octagon, open, and lock seam tubing. Any desired length

of tubing can be cut by adjusting a stop. If the tube is not fed its proper distance, the machine is so arranged that it will not operate. Positive lubrication is said to be provided to all moving parts of the machine.

"Standard" SWAGING MACHINES SHAPE AND JOIN METALS Without Cutting

• In one rapid operation "Standard" Swaging Machines reduce, point, and form tubing or bar stock — without loss of material. They also attach fittings to tubing, wire or cable. Parts swaged are smooth, strong and accurately sized. "Standard" Swagers have many special features for durability and fast, easy operation.



16MM SOUND FILM, 26 minutes, showing principal and applications of Swaging, offered engineering and production groups, Write for available dates.

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ATLANTIC GEAR WORKS, INC. 1984, Lafayette St., N. Y. 12, N. Y. CAnal 6-1441

CAMS

Our ROWBOTTOM cam cutting facilities are at your disposal for your cam requirements.

Let us have your inquiries.

BLOOMFIELD TOOL CORP.

37 FARRAND ST. BLOOMFIELD, N. J.

TOOL ROOM OPTICS

TROUBLE SEEING
YOUR LAYOUTS?
DIFFICULTY CENTERING
THEM ACCURATELY?

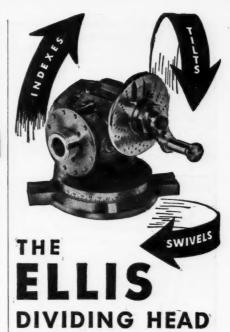
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- Functions on any machine with cross-feed.
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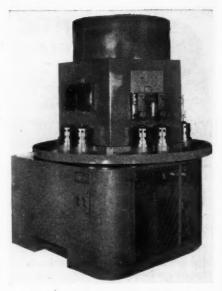
Many unique features make the ELLIS Dividing Head more than an ordinary indexing fixture. It is a precise, rugged unit with 6½" normal swing increased to 11" swing through the use of riser blocks. It TILTS more than 100 degrees in the vertical plane—SWIVELS 360 degrees in the horizontal plane—INDEXES by crank, or directly by hand. Work is held between centers, or in chucks or collets. The ELLIS Dividing Head is a universal work head that will increase the production versatility of your milling machines, grinders, drill presses and itig borers—write for complete details today.



Hoem & Dilts Model 10-5 Boring Machine

Believed to be the first standard high production precision boring machine designed specifically for the use of Carboloy solid cemented carbide boring bars, the Hoern & Dilts Model 10-5 Boring Machine shown herewith has been announced by Hoern & Dilts, Inc., Dept. MMS, 925 Rust Ave., Saginaw, Mich. The machine is a 5-station 10-spindle unit with a Carboloy boring bar for each work spindle. Standard carbide boring bits are inserted in each boring bar.

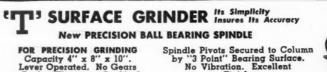




Hoern & Dilts Model 10-5 Boring Machine

The head of the machine is pentagonal, each side incorporating two boring bars. In operation, the head and work table revolve continuously. The work spindles stop turning at the loading station, the boring bars also retracting. The spindles again start turning automatically when the loading station has been passed. Wear resisting inserts of Carboloy cemented carbide are also used on the cams to ensure continuity of accuracy and long life.

The principal advantage claimed for the Carbolov boring bars used in the machine is their ability to bore parts of greater lengths-to-diameter ratios with maximum accuracy due to the fact that

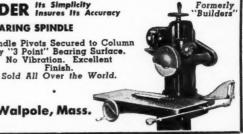


Finish.

Capacity 4" x 8" x 10". Lever Operated. No Gears or Racks. Eliminates Backlash. Bench or Floor Models.

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WALTON TAP EXTRACTOR

Prices range from \$1.50 to \$2.20 for the The fastest, easiest, safest and most economical way to remove a broken tap from the work is with a WALTON EXTRACTOR.

No Mangled Threads— No Scrapped Work— No Frayed Nerves

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MARK IRON, STEEL and CARBIDES





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Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides—quickly—plainly. • Three sizes to meet all requirements.

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GSY-5

"The Outstanding Basic Improvement in FLEXIBLE SHAFT Machinery in 25 Years"

The NEW Strand Rotoflex 4-speed gear drive Flexible Shaft Machine (shown upper right) is another step forward in Strand quality precision tools for faster, easier, more economical production work. The Rotoflex 4-speed gear drive employs a patented, new type of quick change gear drive utilizing 4 positive speeds by a unique and easy method of instantly changing from one speed to another. Rotoflex machines are powered with totally enclosed balbearing motors having speeds from 850 to 9000 R.P.M., depending on motor.

Standard type Strand machines, (lower right) give portable rotary power at constant speeds with dependable results in all grinding, buffing, drilling, wire brushing and rotary filing operations. Hundreds of types and models from % to 3 H.P. available with suitable attachments for your specific requirements.

Distributors in all principal cities
Ask for Bulletin No. 43 and Catalog No. 30



N. A. STRAND & CO.

CHICAGO 40, ILL.

M-5

the high rigidity of each bar reduces both deflection and "wind-up" to a minimum. The machine has a capacity for work with 6-inch maximum O.D. and 1/4-inch minimum I.D. The maximum boring depth of the unit is 5 inches.

Spindle and work table speeds are changed by means of interchangeable Vbelt pulleys in the drive from the main 10 h.p. 1,800 r.p.m. spindle drive and the 2 h.p. table drive motors. The table and head are supported on radial and thrust roller bearings on the machine column.

Operation of each toolslide is effected through a master cam mounted on the machine column. Intermediate cams control infeed or retraction (radial) of the tools. Graduated micrometer dials on each toolslide permit readjustment of the tool setting while the machine is in operation. The toolslides are made of tool steel.

Campbell Model 470 Cutamatic

A fully automatic abrasive cutting machine with oscillating head, designated as the Model 470 Cutamatic, is announced by the Andrew C. Campbell Division, American Chain & Cable Co., Inc.,

Bridgeport 2, Conn. Designed to cut materials up to 6-inch diameter solid stock, the machine is sequence timed so that no adjustment of the timing cycle is re-



Campbell Model 470 Cutamatic

quired regardless of the size of stock being cut or length of feed, it is claimed.

According to the manufacturer, all operations of the Campbell Model 470 Cutamatic, including stock feed, clamping, adjustment for wheel wear, ejection of cut pieces, and stop after final cut, are completely automatic. In the machine cycle, the abrasive wheel cuts through the

* DUCTLESS DUSTKOPS can usually be installed in twenty minutes.

STOP DUSTS

HOW? . . . with DUSTKOP

Model 1150 illustrated

WHEN? ... within 20 minutes*

■ DUSTKOP stops abrasive and firehazardous wood, rubber and similar combustible dusts. DUSTKOPS are firesafe. (Built of steel and non-inflammable spun glass). DUSTKOPS have high suction, big dust storage capacity, with space-saving compactness plus high efficiency dust separation. Unit-type DUSTKOPS save power: operate only when needed. Complete line of DUSTKOPS for all dusts.

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Maximum Gripping Power with
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Long Life.
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T. R. Almond Mfg. Co.
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A general purpose, tangent cut, roller rest box tool of wide range for turning diameters from bar stock, castings, forgings or other material. Applicable to all sorts of screw, turret and other machines, hand or automatic. It is simple to set and eliminates resetting when it is necessary to grind the bit. Write for descriptive folder giving complete information.

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Get "Dependable Power"
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DOERR Motors!

Although we have been building standard fractional H. P. motors for years, the majority of our production is taken by manufacturers whose basic product design or end-use requires special features. We are providing such service to many leading names in industry, and would be pleased to consult with you on your motor design problems.

Write for Catalog and Prices
68 No. Third St., Cedarburg, Wisc.

ELECTRO MACHINES, INC.



From 1/20 to 2 H.P.

Standard or Designed to Your Specifications

work, while the feed carriage is being returned to the left-hand or starting position. At the completion of the cut, the abrasive wheel is raised to the "up" position. The work clamps are then raised clear of the work and, at the same time, the clamp of the feed carriage is moved to the right against its stop. The bar clamp is released and, at the same time, the work clamp moves downward and firmly clamps the bar into a V-block. The abrasive wheel is then started downward and the cycle repeated.

An efficient coolant system is said to enable the machine to smooth as it cuts.

The unit can also be furnished in a semiautomatic model designated as the Model 460.

United States Improved Model 110 Double-Spindle Buffer and Polisher

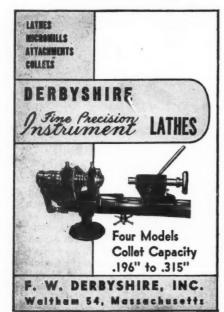
Incorporating features which are said to provide for still greater efficiency and ease of operation, an improved Model 110



United States Improved Model 110 Double-Spindle Buffer and Polisher

Double-Spindle Buffer and Polisher is announced by The United States Electrical Tool Co., Dept. MMS, Cincinnati 14, Ohio. Two simple levers located at the top of the buffer operate "push to start" and "pull to stop" switches. The combination switch and brake units are arranged to automatically stop the wheel spindles when the switches are in "stop" position. The action is instantaneous.

Although designed primarily for the polishing and burnishing trade, the United States Improved Model 110 Buffer and Polisher can also be used in many other industries. The two chrome-manganese steel spindles of the unit are mounted on heavy duty ball bearings and are protected by dustproof housings. The spindles are driven individually by separate motors in the base which are



NO BUSHINGS, GUIDES or PILOTS NEEDED!

THE READING BROACH KEYSEATER

The Reading Bench Machine requires no bushings, guides or pilots. No other machine like it. Very fast—capacity from 1/6 to 3/6 cutter.

Low first cost-prompt delivery.

READING MACHINE COMPANY, Reading (Cincinnati), Ohio



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EXPANDING MANDRELS

Set of 14 does the work of 209 solid arbors. Not infrequently, time studies show operations are completed



TYPE A—Step jaw design. Especially adapted for holding work with short bores; for hexagonal broached holes as well as round.

in less time than was formerly consumed in looking for or turning a solid arbor. For all bores ½" to 7". Hardened tool steel. Sold singly or in sets. Used in shops the nation over. Test the time-saving possibilities of these precision tools in turning, milling, grinding. BULLETIN 1043.

W. H. NICHOLSON & CO.

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• Our Engineering Department will assist you in the design and application of high quality fine pitch gears, worms, etc., without obligation. We invite you to submit your prints for quotation.

Write for latest bulletin describing Beaver Gear Facilities and Methods.

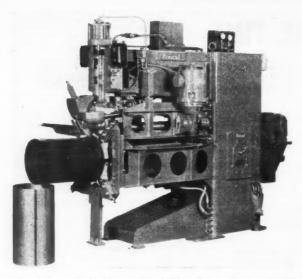
GEAR REFLECTIONS

- Gears are the motivating force in such units as highly sensitive instruments, fishing reels, timers, tuning devices, or gear reducers. The smooth operation and often the success of these units depends on the quality of gears used.
- Quality-made gears reflect the ability and experience of their maker. In turn, they also reflect the reliability of the unit in which they are installed.



1022 PARMELE STREET

ROCKFORD, ILLINOIS



mounted on individual adjustable platforms to allow for belt tension adjustment. Individual push buttons allow for the operation of either of the spindles or both spindles at the same time. The back of the machine is made of heavy gauge sheet metal and is removable to allow for full accessibility.

Federal Automatic Cylinder Forming Seam Welder

Theaccompanying illustration shows an automatic cylinder forming seam welder now being offered by The Federal Machine and Welder Co., Warren, Ohio. According to the manufacturer, the machine can be arranged

to process 26 to 16 gauge mild steel cylinders ranging from 11½ inches in diameter x 14 inches long to 22 inches in diameter x 37½ inches long at production

MICO

2 and 3-Dimensional ENGRAVER

• NOW you can do three-dimensional milling by tracing shape of enlarged master with stylus. The 252 Engraver fills the need for a portable, inexpensive, dependable and accurate machine to make small dies and molds for plastics, rubber, glass, or die castings, and other forming operations. Master can be reproduced in any of four reduction ratios.



Improved pantograph design simplifies conventional engraving of templates, nameplates, panels, trademarks and machined parts.

Write for 8-page illustrated folder which gives complete details.

MICO INSTRUMENT CO. 76 TROWBRIDGE, MASS.

TAPERED SPIRAL END MILLS



For Clearance on Dies, Molds, Patterns. Tapers $\frac{1}{2}^{\circ}$ to 7°. Flute length $\frac{1}{2}^{\circ}$ to $3\frac{1}{2}^{\circ}$. Dealer Inquiries Invited.

Write for catalog.

Cadillac Cutter Co.

1611 Eastern S.E. Grand Rapids 7, Mich.

60 YEARS MANUFACTURING

Multiple Spindle Drilling and Tapping Machines • Automatic Drilling and Tapping Units • Multiple Spindle Attachable Drill Heads • Hot and Cold Swaging Machines • Hammering Machines • Tools, Jigs and Fixtures • Contract Work • Special Machinery.

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Providence 7, Rhode Island

Symbol of Speed Reducer Quality





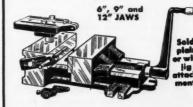
Spur, worm, and combinations. Compact, Dust-proof. Oil-tight. Maximum power efficiency. Positive alignment. Meet every installation condition. Over 75 types and sizes. Send for complete catalog.



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You'll find 1,000 uses for this Vise!



GRAHAM MULTI-PURPOSE VISE

In 3 sizes up to 124 lbs. this vise serves innumerable purposes where a jig or fixture would otherwise have to be specially made. Available attachments include stops, guides, V-jaws, shell jaws, bushings, etc., for accurate repeat - operation positioning of thousands of different shapes.



REQUEST BULLETIN 41

"Adjust-angle" KNURL HOLDER

Many patterns
using only
straight
knurls.



On work up to 21/2" dia., this Knurl Tool produces a variety of straight, spiral and diamond patterns, using only straight knurls. Shank made to fit your turset (or lathe tailstock). Equipped with passing-over-stock feature if desired. Graduated adjustment of knurl angle.

For prices and details request
Bulletin 41

Graham Mfg. Co.

35 Bridge St.

East Greenwich, R. I.

rates of 600 to 1,500 per hour, depending upon the length and material thickness

of the cylinders.

The machine shown is arranged for manual feeding but can also be automatically fed if desired. Sheet stock is moved onto the forming rolls of the welder and automatically welded and ejected onto a conveyor or mechanical handling system. An abrasive blast sheet edge cleaner, with provision for automatic transfer of the work into the welder forming rolls, can be used with the machine when processing cylinders from hot rolled or rusty steel.



M - D Facing Heads

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse; feeds automatically. Sizes 6° to 46° diameter.

Write for circular.

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T. H. LEWTHWAITE MACHINE CO.



METAL LATHERS' BENDER

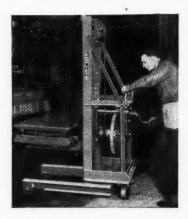
This machine will bend up to ½" square or round iron, 2" x ½" channel iron, 2¼" x 5/16" flat iron cold. Weight 40 lbs.

Circular on Request

317 EAST 47TH ST. NEW YORK CITY PLaza 8-0380

Economy Type DX Heavy Duty Shoplifter

The Economy Engineering Co., 2653 W. Van Buren St., Chicago, Ill., announces that its standardized portable elevator,



Economy Type DX Heavy Duty Shoplifter

the Economy Shoplifter, is now available in a heavy duty design designated as the Type DX. The heavy duty unit is made in two capacities of 1,000 and 2,000 lb. and includes an unusually heavy framework of all-welded steel construction and a ball bearing hand power hoist unit of the crank-up and crank-down type. Features of the hoist unit include an automatic holding brake that does not require manual setting or releasing by the operator; a safety ratchet and pawl that are also said to automatically hold the load; and sufficient number of ball bearings to provide minimum friction in operation. Under a full rated capacity load, the hoist unit is claimed to require a crank handle



TOOLRAK Saves TIME AND TOOLS

Your workers always have the right tools at their fingertips when you equip your shop with Toolrak. Because the selected hardwood blocks are interchangeable in the extruded aluminum backstrips, you arrange them any way you want, rearrange as often as you wish. Get Toolrak in factory-assembled sets or buy individual blocks and strips to fit your special needs. Send for free folder.

Set No. 8-7, 8" long, holds 7 tools, \$1.25 Set No. 12-10, 12" long, holds 10 tools, \$1.90 Set No. 18-14, 18" long, holds 14 tools, \$2.55

If your dealer or mill supply house can't supply you, order direct.

Mail orders add 10¢ per set to cover packing and mailing.

DAVIS DEVELOPMENT CO. •

348-5 1st Nat'l Bk. Bldg. Colorado Springs, Colo. Se

"This multiple drill head has increased our torch cone end production by about 600%."



When this MULTI-DRILL went into operation with a seven-station full automatic step drilling machine, welding torch cone end production at the Victor Equipment Co., manufacturers of gas welding and flame cutting equipment, went up "about 600%."

Why not see how your production can be increased with a MULTI-DRILL—the production drilling head designed for accurate high speed drilling? Available with 2 to 8 spindles; quickly and easily adjusted to any hole pattern on or within a 9" circle; ½" min. center distances. Drill sizes 1/32" to ¾8". Special adaptations available.

Write for details and name of your nearest Distributor

COMMANDER MFG. CO. 4224 W. Kinzie Street • Chicago 24

Product of Commander - Builder of the Commander Tapper

Standardize on Carbide! Standardize on [N]s?

N.T.S. is an important new source for both standard and special carbide tipped tools.

For 34 years N.T.S. has reworked cutting tools for large industries—is thoroughly grounded by long experience in the fundamentals of good H.S.S. and carbide tool design.

The best way to protect your carbide tool investment is to select the most experienced source you can find...WRITE TODAY FOR OUR NEW CARBIDE TOOL CATALOG!

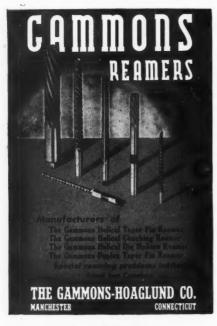
CARBIDE TOOL DIVISION

NATIONAL TOOL SALVAGE COMPANY

CORE DRILLS REAMERS TWIST DRILLS SOLID CARBIDE DRILLS SLOTTING **CUTTERS** DRILL FOR HARDENED STEEL END MILLS FACE & SHELL END MILLS



MICHIGAN CHROME & CHEMICAL COMPANY 6340 E. Jefferson Ave. • Detroit 7, Mich.



pressure of approximately 20 lb. to elevate or lower a load.

The overall framework dimensions are identical for both the 1,000 and 2,000-lb. capacity models; however, the heavier model has several reinforcing members to allow for the accommodation of the heavier loads. The overall height and width of the framework of the Type DX Heavy Duty Shoplifter are such as to allow the unit to be moved through an ordinary doorway 6 feet 8 inches high x 25 inches wide or larger. The narrow baseframe width and platform permit the machine to be operated down narrow aisles and between closely spaced machines.

Additional features of the Economy DX Heavy Duty Shoplifter include two 5-inch diameter base wheels under the platform and two 6-inch diameter swivel casters at the opposite end of the framework, as well as a push bar for easy steering of the unit across the floor. A heavy duty foot-operated floor lock is an optional feature of the machine.

Fiske No. 231 Die Casting Compound

Identified as the No. 231, a die casting compound for use in the production of small or large zinc and aluminum die castings is announced by the Fiske Brothers Refining Co., Dept. MMS, 129 Lockwood St., Newark 5, N. J. Applicable with a brush or swab and also said to be easily liquefied by heating for spraying, the compound, it is claimed, does not fume, flash, or give off offensive odors and reduces soldering to a minimum.

According to the manufacturer, Fiske No. 231 Die Casting Compound provides for the production of clean smooth pieces that are free from surface imperfections and discoloration. In addition, maximum accuracy and uniform strength, as well as increased tensile strength due to minimized gas formations, are claimed to be obtained through the use of the compound, which is also said to allow for a maximum number of passes between applications, thus permitting speed with increased economy in production and with unusually long die life.

Bridgeport Model 51 Automatic Abrasive Cut-Off Machine

The Bridgeport Safety Emery Wheel Co., Dept. MMS, Stratford, Conn., has developed a fully automatic abrasive cut-off machine, designated as the Model 51,

PRECISION BROACHES

Manufacturers of standard and special broaches—broaching fixtures. A complete service for sharpening, reconditioning and converting broaches. Standard keyway broaches in stock.

Dependable, Prompt Service

Several territories open for representation.

CONANT Tool & Engineering Co.

347 WEST 107TH STREET

Why Use A Shaper to cut Keyways when a

DAVIS KEYSEATER

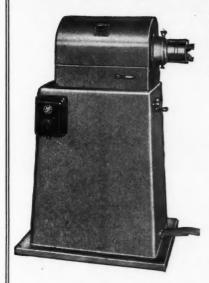
will do the job so much quicker and better?

Send for Circular



DAVIS KEYSEATER CO.

Exchange and Glasgow Sts. ROCHESTER, N. Y.



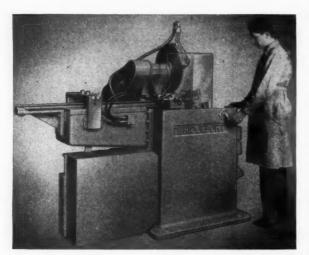
SCHAUER SPEED LATHES LAP and POLISH

Metal and Plastic Parts
Better, Speedier, at
Lower Cost!

Production records prove that Schauer low-cost Speed Lathes save time... increase production... lower operating costs... afford greater efficiency and faster handling of parts requiring Deburring, Filing, Lapping, Polishing. There is a size and type of Schauer Speed Lathe for almost every secondary finishing operation.

Write for Catalog 480.

The Schauer Machine Co. 2060 Reading Rd. Cincinnati 2, Ohio



Bridgeport Model 51 Automatic Abrasive Cut-Off Machine

and accuracy on the ma-

The head assembly, which consists of an 18inch abrasive cut-off wheel driven through Vbelts by a 10 h.p. motor, is mounted on a rocker shaft operating in Timken bearings and is actuated by a hydraulic cylinder that feeds the wheel in and out of the cut. The hydraulically operated feed mechanism is synchronized with the cutting head and automatically feeds a prede-termined length of stock into position where it is gripped by a hold-

ing vise. After the cut has been completed, the wheel withdraws, the feeder returns to normal position, and the cycle is repeated automatically until the stock is exhausted or the machine is stopped.

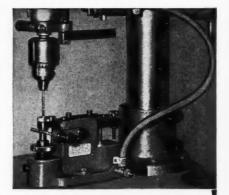
which is designed for the high speed cutoff of stock up to 2 inches square to lengths ranging from ¼ to 12 inches. Steel, brass, plastics, porcelain, and other materials are said to be cut with speed

POR-MATIC

AIR-OPERATED

DRILLING FIXTURE

• This Universal drilling fixture is rigid, sturdy and machined to exact tolerances. It will handle round stock 1/16" to 1" and by using a special upper beam or drill bushing carrier 1½" can be received for cross drilling. Special drill bushing carrier can be supplied for multiple spindle drilling also for drills 5/16" to 15/32." This



Patent Pending

fixture can be mounted on any of the regular bench type or floor type drill presses in a matter of minutes. Depending on type of material and diameter of hole size, it will increase production from 33% to 200%.

Send for literature giving complete description.

THE PORTER MACHINE CO.

3139 ENYART AVE

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PILOT BUSHINGS Frictionless ---Rotary

For core drilling, T.
C. and h i g h speed boring, turret tool, piloting, etc. Won't stick or clog. D u stick or clog. D u street or details.

Write for details.

GIERN & ANHOLTT TOOL CO. 1300 Mt. Elliott Ave. Detroit, Mich.

For fitting drill chucks and other

Semi-machined
DRILL CHUCK
ARBORS

For fitting drill chucks and other tools to lathe spindle or turret head. Made of steel with ground shank. You machine to fit chuck or other tools.

SOUTH BEND LATHE WORKS 427A East Madison Street, South 22, Indiana

ARBURS See your deal

ARBORS with No. 2 taper shank . . . \$0.85 No. 3 taper shank . . . 1.30 5/8" straight shank . . 1.15 3/4" straight shank . . 1.20

See your dealer - or sent direct postpaid.

SUPERIOR GRINDING LOWER COST



ACHINE COMPANY GREENFIELD HASSACHUSETTS OSA



Palmer-Shile Automatic End Dump

Designed by the Palmer-Shile Co., 16022 Fullerton Ave., Detroit 27, Mich., the automatic end dump shown herewith is said to be ideal for handling and dumping sand, castings, scrap, stampings, and other heavy materials. The unit is claimed to fit any fork or lift truck and can be built with rubber or metal wheels instead of legs, thereby making it excellent for moving around heavy machinery and through narrow aisles.

Built of heavy steel plate reinforced



USED FOR 30 YEARS IN TOOL ROOMS AND PRODUCTION SHOPS FOR PRECISION BORING

Head No.	Body Dia.	•	Bar Capacity	Micro	Price
6	175"		36"	34 **	\$ 22.
8	314"		34"	1/2"	30.
10	4"		34"	1/2"	70.
12	4"		34 **	1"	45.
20	71/2"		11/2"	1"	125.
30	4"		36 **	114"	70.
32	516"		1"	2"	115.
35	4%"		34 **	11/2"	8.5.
36	6%"		114"	2"	150.
	No. 6 8 10 12 20 30 32 35	No. Die. 6 1%" 8 3¼" 10 4" 12 4" 20 7½" 30 4" 32 5¼" 35 4%"	No. Dia. 6 176" 8 314" 10 4" 12 4" 20 7½" 30 4" 32 5½" 35 4¾"	Mead Body Bory Bory Received No. Dic. Capacity	Mead Body Capacity Offset

MANUFACTURING CO.



Palmer-Shile Automatic End Dump

with heavy angles, the Palmer-Shile Automatic End Dump is of all-welded construction and includes rockers, geared to the truck, which are self-seating and smooth operating. The unit is available in two sizes with capacities of ½ and 1 cubic yard and weighing 600 and 750 lb. respectively.

"Hisey" Drill Grinder

The Hisey-Wolf Machine Co., Dept. MMS, Cincinnati 25, Ohio, announces the addition to its line of "Hisey" grinding



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long soughta more accurate and surprisingly faster way of transferring blind screw holes.

The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in 18" to 1" diameters. Send for price list.



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Urbana, Ohio



CONTINUOUS HINGES

Manufactured by

AUTO MOULDING & MFG. CO.

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Over 4,000 shapes, cuts and sizes of both Swiss and American patterns.

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Garson - Newton Co. 61-71 MILL ST. BELLEVILLE, NEW JERSEY



INSIDE DEBURRING CUTTERS



30° - 45° STOCKED IN 8 SIZES EACH ANGLE



SPECIAL ANGLES
FROM STOCK BLANKS





HAND USE (4 THREAD SIZES)

RADIUS TYPE 10 SIZES

SEVERANCE TOOL INDUSTRIES INC.

724 IOWA STREET

SAGINAW. . MICHIGAN



and buffing equipment of a grinder especially designed for sharpening flat beaded drills now being widely used for very tough metals, particularly in the railroad field for drilling track. A holder provided on the left side of the machine is used in grinding the points of such drills, while a holder on the right side is employed for thinning the webs of the drills.

The Hisey Drill Grinder is designed to handle flat drills from ½ to 2 inches in diameter. The point grinding attachment on the left end of the unit also allows for the grinding of ordinary twist drills from ¼ to 2½ inches in diameter. Point angle and clearance angle are adjustable. Adjustment is also provided for grinding the webs of flat drills to the desired

thickness. Diamond dressers are furnished for both of the grinding wheels of the machine.



TAP BREAKAGE Reduced

Square, Straight Tapping in Half the Time

The Dahlstrom Tap Guide practically eliminates tap breakage and saves wasted hours getting broken taps out of expensive dies. It does the job in a jiffy with work always straight and true. Just fasten it to a post or bench, slip a Tap Adaptor into the spindle, and even an inexperienced operator can handle it. Equipped with 7 Adaptors, ranging from 8-32 to ½". Taps not furnished. Nothing in your shop will pay for itself faster.

Literature on request.

Dahlstrom Manufacturing Co.

418 South Sixth St., Minneapolis 15, Minn.



Dahlstrom TAP GUIDE



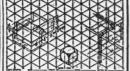
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BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

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WADE'S ISOMETRIC blue lined
paper. Shows all
surfaces and in-

Makes clear blueprints. Saves time daily in hundreds of plants. Write for Circular.

Wade Instrument Co. 1422 E. 109th St., Dept. H, Clevel'd, O.



NEW METHOD
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Dependable B-RIGHT-ON SOCKET SCREW PRODUCTS



The dependable B-Right-On Socket Screw Products line includes Hollow Set Screws and Pipe Plugs, Socket Head Cap Screws and Stripper Bolts.

Production runs solicited.

Our complete, centrally located stock is at your service. Write today for our completely revised stock list and prices.

THE BRIGHTON SCREW & MFG. CO.

Automatic Trip Mechanism for Grant Rivet Spinners

The Grant Manufacturing & Machine Co., Dept. MMS, 96 Silliman Ave., Bridgeport 5, Conn., has developed an automatic trip mechanism for use on three types of its noiseless rivet spinning machines. According to the manufacturer, the automatic trip is a time and laborsaving device which enables the operator to form heads on rivet shanks in from one to two seconds, depending on the rivet diameter, and requires a minimum of pressure on the treadle for operation.

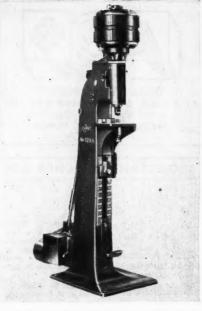


Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S. Inexpensive — Last for years. Write for Circular.

NIELSEN TOOL & DIE COMPANY 1960 W. Eleven Mile Rd. Berkley, Mich.



Grant Type No. 120A Rivet Spinner Equipped with Automatic Trip Mechanism

The trip mechanism is powered by a % h.p. motor, and the spindle motion for proper riveting performance is automatically achieved by means of a cam. By depressing the foot treadle, the trip is actuated for one cycle or the heading of one rivet. The operator may remain seated while running the machine if desired.

The maximum capacity of a Grant Rivet Spinner equipped with the automatic trip mechanism is $\frac{7}{16}$ -inch diameter, and the total weight of the complete unit is approximately 800 pounds.



266



GRAY TURRET HEAD METAL CUTTER OR NIBBLER

N.A.M. Pioneer Award Given to Gray

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

GRAY MACHINE CO. Box 596, Philadelphia, Pa.

A Real Spring Winder!

No. 1 Capacity 0 thru 3/32" wire \$1.50 No. 2 Capacity 0 thru 3/16" wire \$3.00 No. 3 Capacity 0 thru 5/16" wire \$5.00 Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

HJORTH LATHE & TOOL CO.
10 BEACON STREET WOBURN, MASS.

AMAZING ADAPTABILITY

FOR PRODUCTION OR MAINTENANCE

> UNITED STATES No. 1

FULL ANTI-FRICTION BEARING

HAND MILLING MACHINE

Ask your distributor for full details or write direct.



UNITED STATES

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CINCINNATI 16, OHIO

HOW TO GRIND CARBIDE CUTTING TOOL BITS ECONOMICALLY



Here's tool grinding at its best!

Employing 3-step progression—rough, semi-finish, and finish or hone—on one machine, this LeMaire 3-Wheel Grinder produces keener edge in fraction of time. Because tools go to diamond wheels in better condition, life of diamond wheels is considerably lengthened. Both labor and wheel costs are reduced—time is saved—production is increased.

Wouldn't you like to know more about this remarkable 3-Wheel Grinder? Send for descriptive folder.

LeMaire Tool & Mfg. Co.

2657 S. Telegraph Road Dearborn, Michigan

Designers and builders of unit and way type machines for single or multiple spindle drilling, boring, reaming, tapping, etc.—Twin Ram Hydraulic Units—Match it Gear Chucks.

ARTUS ARBOR SPACERS



The COLOR tells the THICKNESS

ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glancel .001, .0015, .0025, .003. .005, .0075, .010-030. Speed up accurate fitting at low cost. Write for folder.

CONVENIENT TRIAL OFFER **Handy Spacer Assortment**

.001 - .0125 thick .015 - .030 thick 5 ea.

100 SPACERS IN ALL

11/4" \$3.10 1" 3.35 11/2" 4.70

Other standard sizes also available.

Illustrated Folder Free. Immediate Delivery on Spacers, Gaskets, Shims, Large Slitting Saw Spacers.

Industrial Products Suppliers Dept. M. 434 Broadway, New York 13, N. Y.

FROM STOCK REAVES-SILENT BAKELITE GEARS



No waiting when you order Greaves Silent Bakelite Gears. . We have them in stock NOW! . Your order will go forward immediately. . You'll appreciate the silent operation and added smoothness provided by Greaves Silent Bakelite Gears. . You'll marvel at their great strength to carry big power loads . . . their remarkable ability to successfully operate com-

pletely submerged in water. · You'll welcome their low cost. . No metal reinforcements required. . Save Time . . . Money . . . Labor!

We also make silent gears of rawhide and Fabroil.

Write for Circular.



Elliott Improved Flexible Shaft Machine

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Said to be more streamline, more versatile, and more efficient than its predecessor, the Elliott Improved Flexible Shaft Machine illustrated herewith, product of the Elliott .Manufacturing Co., Dept. MMS, Binghamton, N. Y., features a new type of countershaft mounting located well above the motor tilt axis to provide adequate endwise yielding mo-



Elliott Improved Flexible Shaft Machine

tion to the flexible shaft as the operator tilts the motor assembly, thereby reducing strain on the operator. The countershaft includes a vertical adjustment operating on a lead-screw principle, with finger-tip knob control. With a standard three or four-step cone pulley on the motor shaft, the vertical adjustment is operative through over 4 inches to provide for positive and accurate belt tensioning. By substituting an optional variable pitch pulley for the cone pulley on the motor shaft, the vertical adjustment provides stepless speed variations through a ratio of over 2 to 1.

An improved hinged guard with shock mounting is arrang d to swing away from the drive pulley at the press of a button, exposing the parts so as to facilitate changing of belts or belt positives. Additional features of the machine include a simplified toggle switch mounting incorporated in the motor end bell, a circular tool tray (optional equipment), and a utility box over the motor for small wrenches and accessories. All handpieces, as well as the countershaft and motor, are of ball bearing construction, and a ball thrust bearing is employed for pivoting the welded steel yoke. The machine utilizes a non-ravel flexible shaft of coldworked music wire operating within a reinforced rubber case.

"Lign-O-Matic" Self-Centering Drill Turret

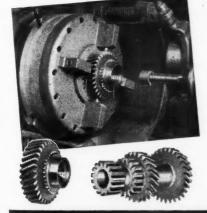
A self-centering drill turret is now being marketed under the trade name of "Lign-O-Matic" by Howe & Fant, Inc., Dept. 11V, 521 Flaxhill Rd., South Norwalk, Conn. The turret is so constructed that its six spindles are automatically centered and aligned by the drill press spindle, thus providing the turret a sustained accuracy equivalent to the drill press to which it is attached.



"Lign-O-Matic" Self-Centering Drill Turret in Use

The cutaway view herewith of the Lign-O-Matic shows how automatic centering and alignment are accomplished. The six Lign-O-Matic spindles are

PATENTED



DIAPHRAGM CHUCKS

Look, a high speed, precision chuck with no parts to wear out! Result: Maximum accuracy, minimum maintenance! Because the Woodworth design assures the ultimate in concentric chucking. Obviously, it will solve your precision chucking problems, as it has already for large manufacturers of gears and other production parts. Send your precision chucking problems to us—at no obligation.

MECHANICALLY OR AIR OPERATED

ACCURACY YOU CAN TRUST

WOODWORTH

N. A. WOODWORTH CO. . 1300 E. NINE MILE ROAD . DETROIT 20, MICHIGAN

mounted on specially designed floating bearings so that they are free to move laterally and angularly, as well as to rotate. As the tapered driving unit attached to the drill press spindle engages the mating taper of a Lign-O-Matic spindle, it centers and aligns the spindle and locks it in that position until the drilling operation is completed.

Driving power is transmitted directly from the machine spindle to the Lign-O-Matic spindle by the same tapered surfaces that provide for alignment. These mating tapers are S.A.E. 4615 and are hardened and ground to a mirror finish

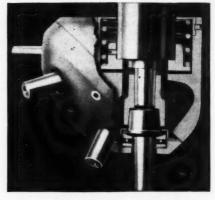
STANDARD

TAPER PINS

The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins, Woodruff keys, machine keys and machine racks.





Cutaway View Showing "Lign-O-Matle"
Construction

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with an accuracy of 0.00015 inch, it is claimed. The tapers are said to turn a ½-inch drill through the hardest material without a lead hole and yet disengage for indexing without effort and without stopping the motor.

According to the manufacturer, the Lign-O-Matic is simple to attach and detach and in no way damages the drill press. Six different machining operations may be performed with the turret, such as drilling, reaming, counterboring, and so on, without the operator leaving his seat or moving the work. Tool changes are made by raising the drill press lever and indexing the turret to another station.

Palmer-Shile Hand Dump Truck

Although designed primarily to catch turnings from screw machines, the hand dump truck shown herewith, product of the Palmer-Shile Co., 16022 Fullerton Ave., Detroit 27, Mich., is also said to be

STANDARD CARBIDE BLADES.

For All Types of Milling Cutter Bodies

Carbon Tool Steel Shank
Lower Cost
Stock Delivery
Guaranteed
No. 100 LH GRADE

Oversize Tip-Diamond Lapped Flush
With Top of Shank

10° Relief Angles
Preformed On Fip and Shank
Blade Number and Grade Visible
After Blade Is Assembled in Body

We Fabricate All Types of Carbide Tools. Write for Bulletin No. 101.

or Send Print or Sample for Quotation.

Check These Advantages:

WISCONSIN CARBIDE TOOL CO., 2437 W. Fond du Lac Ave., Milwaukee 6, Wis.

Workmanship



yard and is equipped with two 8-inch steel wheels and two 4inch metal swivels. The weight of the unit is approximately 125 pounds.

Acromark No. 56 Automatic Enameling Machine

Signs, frames, end-plates, license plates, name plates, and other sheet metal, cast metal, or molded plastic products can

be automatically enameled on the raised faces of letters, numbers, or designs with the Acromark No. 56 Automatic Enameling Machine shown herewith, according to The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. The machine is completely enclosed in a sheet metal cabinet of 24 x 36 x 60 inches except for the enamel-applying rolls which are fully guarded and move backward and forward in a horizontal plane in the top of the machine. A revolving ink platen, a disc revolving beneath an enamel

ideal for holding scrap and for many other uses. Constructed of heavy sheet steel reinforced with a flange along the top edge, the truck includes a sturdy %-inch round rod iron handle welded to the body. The unit measures 25% x 45 inches at the top and 25% x 27 inches at the bottom and is 17½ inches deep. The overall height of the truck is 23 inches; however, the unit can be furnished in greater or lesser heights on special order.

The Palmer-Shile Hand Dump Truck has a capacity of approximately 1/2 cubic

NEW SOLDER REPLACES LITHARGE and GLYCERINE

Cerroseal-35 produces seal between glass dome and metal fitting in this Absolute Pressure Gauge operating under 15 pounds differential pressure with the following advantages over litharge and glycerine seal:

- 1. Does not pull loose under vibration.
- Not dissolved out by various vapors to which subjected in use.
- 3. Leak-tight joint obtained immediately upon setting.
- 4. Dome breakage eliminated.
- 5. Less skill required for assembly.

Cerroseal-35 adheres directly to clean smooth glass, mica and most ceramics. Bonds to most metals like ordinary solders. Low working temperature—approximately 260° F. makes it an ideal hermetic seal for glass dial covers on delicate instruments and many other applications.

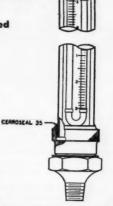
Write for instruction sheet and working sample.

CERRO DE PASCO COPPER CORPORATION

DEPT. 1

40 WALL STREET

NEW YORK 5. N. Y.



LUMA Standard Etchtool



A rugged tool built for long hard service and a wide variety of work. Many in use for more than 10 years. Etches hardened steel as fast as you can write. Dial control of heat . . . High, Medium and Low. Write for details.

9 Stages
of Marking
Control

From Light
to Extra
Heavy

Luma Electric Equipment Co. P. O. Box 132-M.S. Toledo 1, Ohlo fountain, transfers the enamel to the rolls which, in turn, pass over the parts to be enameled as they move along a conveyor.

The conveyor moves horizontally through the enameling position and then drops the part by gravity down a chute where the regular plant conveyor or a truck transports the enameled parts away for drying. The parts shown in the illustration are embossed aluminum, each 8 inches long x 3 inches wide with a 1½-

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Acromark No. 56 Automatic Enameling Machine

inch flange on each end. The speed of enameling these parts is claimed to be 2,000 per hour. Feeding of the machine can be accomplished either with a conveyor or by hand, and, since two enameling rolls apply enamel to each part, a thorough coverage is said to be assured.

The Acromark No. 56 Automatic Enameling Machine is completely motor driven and includes a handy push-button control. The motor is a ½ h.p. 200-volt 3-phase a.c. gear reduction drive type.

"OLIVER"
No. 270 Tilling Arbor
SAW BENCH

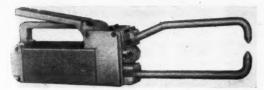


Patternmakers like this "Oliver" for ripping, cross-cutting, dadoing, etc. Table remains level while saw tilts up to 45°. Table and gauges accurately graduated. Quickly adjustable. Write for Bulletin No. 270D.

"Oliver" makes a complete line of equipment for pattern shops.

OLIVER MACHINERY COMPANY Grand Rapids 2, Michigan Greyhound Portable Self-Operating Spot Welder

A lightweight completely portable selfoperating spot welder which is designed to weld up to 1/4-inch combined thickness



Greyhound Portable Self-Operating Spot Welder

of metal is now being manufactured by the Greyhound A. C. Arc Welder Corp., 606 Johnson Ave., Brooklyn 6, N. Y. Described as an essential tool for sheet metal and truck and body repair shops, the unit is also said to be ideal for welding jobs on window frames, skylights, display signs, kitchen equipment, wire fences, blowers, and ventilating systems, as well as for quick welding jobs in hard-to-get-at places.

Weighing approximately 23 lb., the Greyhound Portable Spot Welder is enclosed in a compact non-corrosive cast aluminum casing with an integral aluminum handle for easy carrying. The protruding copper arms are available in three lengths of 6, 12, and 18 inches, and the durable replaceable special alloy tips can be obtained in an assortment of shapes for special needs. The welder includes a sil-

icon steel and copper transformer wound

with burn-proof spun-glass insulated magnet wire which is said to provide for safe high heat conductivity. The unit is

supplied complete with 10 feet of cable and is available in either 220 or 110-volt models.

Miccrosol E-1003 Rack Coating

An improved single-dip heat-cured rack coating to be known as Miccrosol E-1003 has been introduced by the Michigan Chrome & Chemical Co., Dept. MMS, 6340 E. Jefferson Ave., Detroit 7, Mich. In a single application, the material is claimed to produce a tough, smooth, leather-like coating featuring unusual tensile strength, adhesion, hardness, tear strength, elongation, and recovery.

According to the manufacturer, Microsol E-1003 combines, in addition to positive insulation and protection, permanent flexibility, positive and continuous adhesion, maximum scuff resistance, and sim-

CUSHION MATERIAL for the Job LOVEJOY L-R HIEXIBLE COUPLINGS

Only with flexible couplings fitted to the peculiar requirements of the particular job can you be sure of maximum efficiency.

Write for this Catalog, and Selector Charts for all the data that will enable you to select the coupling suited to your application.

Also mfrs. of Lovejoy Variable Speed Transmissions

LOVEJOY FLEXIBLE COUPLING CO.

plicity of applicaton. Said to withstand all commonly used plating solutions, acids, and caustics, the material is nonporous and has high dielectric strength.

Only one coat of Miccrosol E-1003 is required over the primer, which is said to often outlast the life of the rack itself. The unusual and lasting adhesion of the prime coat, which is also impervious to acids and caustics, is claimed to completely eliminate contamination due to carry-over from capillary action. With the material, racks are said to be completely processed, ready for use, in approximately 2 to 4 hours.



158 East Carson Street · Pittsburgh 19, Pa.

Baldor Air Circulator

The Baldor Electric Co., Dept. MMS, 4351 Duncan Ave., St. Louis 10, Mo., announces the development of an air circulator especially suited for factory use. The unit has a 24-inch blade and is designed to move a large volume of air. It can be supplied with a 1,725 r.p.m. motor or a motor for operation at a speed of 1,140 revolutions per minute.

The Baldor Air Circulator can be obtained in a floor column type, as illustrated herewith, or in a model for ceiling suspension. Further information regarding the Baldor Air Circulator will be sent upon request.



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Baldor Air Circulator

Latrobe Electrite MV High Speed Steels

The Latrobe Electric Steel Co., Dept. MMS, Latrobe, Pa., is now producing a line of high speed steels in various analyses. Identified as the Electrite MV, the line, according to the manufacturer, is distinguished by its chromium, molybdenum, and vanadium content with no tungsten present in the steels, and is well adapted for applications which do not require the full properties of the more common tungsten and molybdenum-tungsten high speed steels.

The Latrobe Electrite MV High Speed Steels are recommended for use in the

"SKELTON" TAPER REAMERS

The Roughing Reamer with two cutting edges ground radial on a taper to correspond with hole to be reamed. Two opposite edges are "backed off" to govern chip thickness. This "safety edge" prevents 'hogging in' or "chattering." A special feature permits straight, centralized holes, even though turret is out of line with spindle. Write for catalog 103 describing this reamer and the Helical Finisher also shown.

Morse, B & S and SAE Tapers in stock. Specials to order.

Dealer Territories Available

ONONDAGA TOOL CORPORATION

FAYETTEVILLE NEW YORK



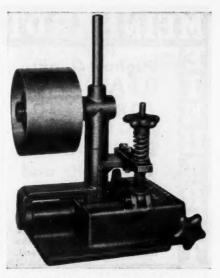
274

manufacture of small drills and reamers, thread chasers, taps, pipe taps, and so on, and for body stock for carbide-tipped drills and reamers.

Hammond Model 6-B Bench Backstand

A bench backstand having an 8 x 4½-inch pulley for accommodating up to 4-inch width abrasive belts has been placed on the market by Hammond Machinery Builders, Inc., Dept. GP-21, Kalamazoo 54F, Mich. Identified as the Model 6-B, the backstand has a net weight of 75 lb. and is said to be especially desirable for limited space wall or ceiling mounted installations.

The 8-inch diameter x 4½-inch face aluminum pulley of the unit is dynamically balanced and mounted on sealed lifetime lubricated precision ball bearings. The heavy cast iron base of the backstand is drilled for mounting purposes. The design of the unit also includes a convenient tension release lever for quick and easy changing of belts; spring-loaded belt tension adjustment operated by a convenient sure-grip hand screw; and positive hand screw operated belt tracking adjustment. The backstand is produced in right and



Hammond Model 6-B Bench Backstand

left-hand styles and can be obtained with a bracket for wall or ceiling mounting.

BLACK DIAMOND

PRECISION GRINDER for ALL SMALL DRILLS SHARP DRILLS REDUCE SPOILAGE — SPEED PRODUCTION



A NYONE can operate a Black Diamond. Even the most inexperienced can keep all small drills sharp—and true centered, with smooth lips accurately ground to exactly the same length—at the proper angle and with correct clearance for fast, precision drilling.

Black Diamond Grinders cut 50% and more on drill grinding costs, sharpen without waste of expensive drill stock, reduce drill breakage and work spoilage to a minimum.

The built-in Diamond Point Dresser keeps the grinding wheel ever-sharp and the Web Thinning Attachment cares for all types of Notched points to perfection.

Whether you use drills singly or in gangs by hundreds or thousands—this moderately priced machine—motor driven—will keep any supply quickly available.

WRITE FOR NEW BULLETIN-TODAY.

BLACK DIAMOND SAW & MACHINE WORKS, INC.
45 NORTH AVENUE . NATICE, MASSACHUSETTS

Highest Quality DIAMOND DRESSING TOOLS and DIAMOND GRINDING and FINISHING WHEELS Write Today for a complete descriptive catalog of the

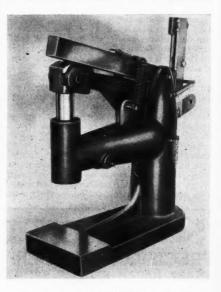
MEINHARDT DIAMOND TOOL CO. 2810 Milwaukee Ave., Chicago, III.

tools or wheels you need.



"High Speed" Automatic Staking Machine

Expressly designed for staking or riveting fixed or movable joints, the "High Speed" Automatic Staking Machine illustrated herewith, product of The High Speed Hammer Co., Inc., Dept. MMS, 313 Norton St., Rochester 5, N. Y., is said to be equally adapted for such operations as eyeletting, inserting grommets, burring, and pointing with platinum, tungsten, or



"High Speed" Automatic Staking Machine

silver. The trip hammer blow can be easily adjusted for the proper amount of pound blow required. The action of the hammer blow, it is claimed, is absolutely uniform, thus assuring interchangeability of assembly parts, and provides for the same blow regardless of any slight variations in the thickness of parts being staked or riveted.

Useful in the production of clocks, cameras, meters, telephones, toys, and electrical instruments and appliances, the High Speed Automatic Staking Machine is available in four different models to meet various job requirements. All four models are available in either manual or motor-driven types, leaving both hands of the operator free for most efficient handling of work during the opera-

tion of the machine.

276

Hydro-Power "Paul Bunyan, Jr." Hydraulic Power Unit

In areas remote from a source of electric power, the Hydro-Power "Paul Bunvan, Jr." Hydraulic Power Unit shown herewith is claimed to provide hydraulic power for a wide range of uses, such as leveling bridges, raising and moving buildings, pin pulling tract-treads on gasoline-operated shovels, heavy jack work, raising and lining railway tracks, wrecking operations, removal of trucks from railway cars or locomotives, pulling drive shaft pins, and so on. Product of Hydro-Power, Inc., subsidiary of The Hydraulic Press Manufacturing Co., Dept. MMS, Mount Gilead, Ohio, the unit is powered by an air-cooled gasoline engine and is said to be capable of supplying three gallons of oil per minute at 1,000 pounds per square inch.

The precision-built gear pump incorporated in the unit is mounted integrally with the operating valve, which has a ball handle lever with forward, neutral, and reverse positions. Check and relief valves are built in the main valve body. Only two operating line connections need be made to ready the unit for service, it is claimed. Permanent suction and return lines are installed between the pump and tank, the latter being provided with an



Hydro-Power "Paul Bunyan, Jr." Hydraulic Power Unit

oil level gage and air filter breather cap. The complete unit occupies a space of $16 \times 28 \times 36$ inches.







STAMPS



of ENGINEERED QUALITY

ARE THE STAMPS TO BUY FOR YOUR MARKING.

"THE ORIGINAL MARKING SPECIALISTS"

Makers of: MARKING AND NUMBERING MACHINES, STAMPS, DIES, TYPE, NAME PLATES, NAME PLATE STAMPING MACHINES, METAL SIGNS, ENGRAVING, BRANDING IRONS AND OTHER EQUIPMENT FOR METAL AND PLASTICS MARKING.

ACROMARK

9 Morrell St., Elizabeth 4, N. J.

"Nu-Arc" Redesigned A.C. Arc Welder

Electric Arc., Inc., 152 Jelliff Ave, Newark 8, N. J., announces that its "Nu-Arc" A.C. Arc Welder has been completely redesigned with no moving parts, and the construction has been simplified to increase operating efficiency. The portable welder is intended for general-purpose use in welding shops, industrial plants, shipyards, and railroad yards.

The Nu-Arc Redesigned A.C. Arc Welder is a plug-in type with multiple-stage heat ranges. The improved design of the





"Nu-Arc" Redesigned A.C. Arc Welder

CUTTERS

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

CUTTER SPECIALISTS SINCE 1919.

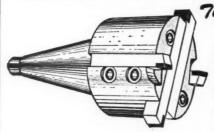
Write today for prices. A few territories open.

QUALITY TOOL WORKS
WAUKEGAN ILLINOIS

unit is said to assure uninterrupted performance by eliminating moving parts which might have to be repaired or replaced and cause delay in work. The simplified construction is claimed to assure dependable long-working life with minimum maintenance.

Mead Impact Hammer and Rotary Work Feeder

The accompanying illustration shows a combination impact hammer and rotary work feeder with universal base which



The New "MILL - MASTER" FACE MILLS

The "MILL-MASTER" is a fast cutting, long life face mill and boring head combination. Each head is equipped with removable, carbide tipped tool bits locked in place by foolproof wedge locks permitting perfect alignment of tools. • Its performance has been proven. Write for complete details.

TOOL SERVICE COMPANY, INC.

533 RIVER ROAD, NORTH TONAWANDA, N. Y.

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has been developed by the Mead Specialties Co., Dept. H-42, 4114 N. Knox Ave., Chicago 41, Ill. The heavy duty cast iron base measures 12 x 17 inches, is approximately 2 inches thick, weighs 70 lb., and has a precision ground surface for supporting fixtures in any desired working position. The base can be conveniently mounted on an ordinary shop bench, occupying a minimum of space yet having



Mead Impact Hammer and Rotary Work Feeder

ample "anvil effect" to accommodate the force of the blow provided by the impact hammer.

Set up as shown in the accompanying illustration, the impact hammer is actuated by the auxiliary valve on the left side of the rotary work feeder. This valve is arranged to open at the moment the dial is locked in position, thus assuring synchronization, and closes as soon as the indexing pawl starts back for a new station, thereby affording the hammer ample time to be reset for the next blow. The combination impact hammer and rotary work feeder with universal base is said to be capable of cycles up to 5,000 per hour.



Hollow M

250 PIECES AN HOUR with 6-SPINDLE KWICK-CHANGE MULTIPLE-ADJUSTABLE DRILL HEAD

That's what they're doing at the Milwaukee Cherry-Burrell plant . . . drilling and hollow milling 3 workpieces simultaneously to tolerances as close as .001". The fixture holds 6 pieces so that two work cycles are completed before re-loading. Note also that deburring is done on a separate drill by the same operator.

Write for complete information.

1227 N. WATER ST., MILWAUKEE 2, WIS.

DISTRIBUTORS FOR WISCONSIN DRILL HEAD CO.

SCHERR aids to precision - production



Save time on Surface Grinders With Scherr MAGNE-BLOX

When placed on magnetic chuck, these magnetism-conducting parallels and angle irons will firmly hold small pieces and irregular shaped work. **No need** of special clamps or fixtures. THEY RETURN THEIR COST many times over by quicker setups, more accurate results, less danger of distortion and bowing when grinding thin flat work. Many different sizes and shapes. DON'T REGRIND YOUR MAGNETIC CHUCKS—BE WISE—USE MAGNE-BLOX—**Special Offer:** Set consisting of 2 parallels 1 x 13/4 x 33/4, plus 2 V-blocks, hard brass and Swedish iron laminations in solid metal case \$17.50. Money back if you can duplicate this value.



Scherr Cutting Tool Grinding Fixture

FOR SURFACE GRINDER, grinds both cutting angle and clearance in one setting. The unique patented feature is a tilting block which gives 3, 5, 7, or 10 degrees clearance to the tool, just the right cutting angle to suit the material to be machined. This simple inexpensive tool does the work of special machines. Clamp the tool to be ground in the Scher Fixture set

machines. Clamp the tool to be ground in the Scherr Fixture, set to angle desired and tilt the block to proper clearance. Special introductory price \$27.50. F.O.B. New York, with Scherr money back guarantee.



Little Wonder Radius Dresser

Dresses wheels on surface or cylindrical grinders to any desired radius up to 1", concave or convex. The swinging arm, the only moving part of this ingenious simple device, is pivoted on two lapped centers which

never freeze or clog. Supported on both ends with no overhang or slides, there can be **no vibration of the diamond.** Result: absolutely smooth and accurate radii on the wheel. The diamond tool is set by means of micrometers, depth gage or gage blocks. Price complete with ½ carat diamond \$46.00—\$39.00 without.

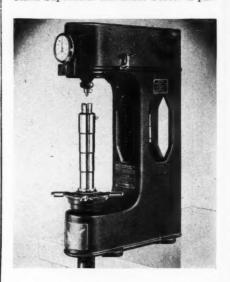
Write for full details on these tools and for the Scherr Small Tool Catalog.

GEO. SCHERR CO., Inc.

Clark Superficial Hardness Tester

Especially designed for testing surfaces that must not be marred even by the standard Rockwell indentation, the Clark Superficial Hardness Tester shown herewith is announced by Clark Instrument, Inc., Dept. MMS, 10200 Ford Rd., Dearborn, Mich. The depth of penetration with the unit is said to be held to limits of 0.005 inch or less.

According to the manufacturer, the Clark Superficial Hardness Tester is par-



Clark Superficial Hardness Tester

ticularly suitable for testing surface hardened steel, unusually thin metals, rolled sheet metal, or very small areas. The machine can also be used for the standard Rockwell testing of materials that are of uniform hardness throughout or wherever a test of surface hardness only is desired.

The tester is available in three models with 8, 12, or 16-inch vertical capacity. Standard equipment of the unit includes a specially formed and lapped diamond cone penetrator; to inch steel ball penetrator; telescoping cover for the elevating screw; oil reservoir for the elevating screw; standard 3½-inch anvil; checking anvil; V-anvil; raised V-anvil; metal dust cover; leatherette instrument cover; and test blocks.

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Lyon - Raymond Improved Hydraulic Sheet Feeding Table

Lyon-Raymond Improved Hydraulic Sheet Feeding Table

The Lyon-Raymond Corp., 5568 Madison St., Greene, N. Y., announces an improved design of its standard 10,000-lb. capacity portable hydraulic sheet feeding table. The unit incorporates the use of two vertical hydraulic cylinders which are synchronized by a toggle lever arrangement.

A faster and more constant elevating speed is said to be provided and easier operation effected in the improved table. The table top is claimed to remain level at all times even under off-center loads. Additional lateral support has been ob-

tained for wide platforms and the total weight of the unit has been reduced.

Specifications of the table are as follows: capacity, 10,000 lb.; platform, 36 inches

wide x 96 inches long; lowered height, 22 inches; elevated height, 34 inches; and elevation, 12 inches. Standard equipment includes a floor lock, towing eye, two-speed foot pump with 5 feet of hydraulic hose, two 8-inch diameter Timken bearing swivel casters, and two 12inch diameter ball bearing wheels. Optional extras include extensions which will provide platform widths to 60 inches and lengths to 144 inches. The table can also be equipped with either a two-speed hand pump or a % h.p. motor-driven pump which can be operated by means of push-button or pedal type switches.

* * * Fluidmotion *

Simplest and most accurate method of FORM-DRESSING!

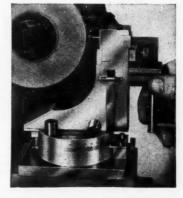
"Fluidmotion" Wheel Dressers generate wheel profiles in such a way that angles and radii flow into each other, without sharp changes of direction. Two angles and a radius can be dressed in one continuous motion—after only one setting of the dresser. "Fluidmotion" Dressers are made of the finest chromium-molybdenum-vanadium alloy steels and have no wearing surfaces, as the gibs and V ways are positioning surfaces only and the dresser swivels on completely dust-protected ball bearings. Several models available. Model F, Illustrated, is the smallest. 5" height to diamond center, dresses wheels up to 7" in diameter, profile radius up to 2". Write for booklet.

* Reg. U. S. Pat. Off.



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life. Easily installed. Get all the facts.

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GEARS **GOOD GEARS ONLY**

All Kinds—Any Quantity AT THE RIGHT PRICE

THE CINCINNATI GEAR CO. Cincinnati, Ohio

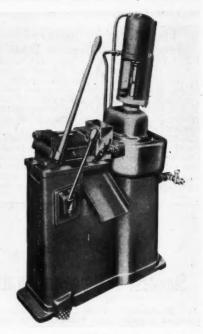


• Pioneers in the riveting field. Head rivets from smallest to %" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO. 96 Silliman Ave. Bridgeport 5, Conn.

DCMT Model M55A/HF Air-Operated Die Casting Machine

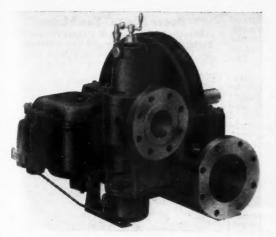
Identified as the Model M55A/HF, a small air-operated die casting machine designed for the quick, economical casting of small parts in zinc alloy, utilizing single-cavity dies operating at high speed, is announced by the DCMT Sales Corp., Dept. MMS, 315 Broadway, New York 7, N. Y. According to the manufacturer, the machine can easily maintain a



DCMT Model M55A/HF Air-Operated Die Casting Machine

production rate of 20,000 shots per week. Features of the DCMT Model M55A/HF Die Casting Machine include optional hand and foot controls and an air system with pilot and ram valves integral. Toggle links are forged clevis hardened steel. The machine carriage is undercut for downpulls and ejecting large castings. The base plate is adjustable to allow for the use of die blocks of any thickness.

The pot of the machine utilizes hydraulic suction to fill the cylinder. A porthole provided at the base of the pot permits all of the metal in the pot to be used before refilling becomes necessary.



G.E. Type DP Mechanical-Drive Turbine

Designated as the Type DP, a small mechanical-drive turbine with ratings ranging from 10 to 1,200 h.p. and with speeds of from 1,000 to 5,000 r.p.m. has

been announced by the General Electric Co., Schenectady 5, N. Y. The unit is available in three single-stage frame sizes with a 16, 20, and 25-inch wheel.

Embodying such features as hydraulic governing for wide speed range and accurate control and pressure oiling of bearings to ensure positive lubrication, the G.E. Type DP Turbine can be applied as a drive for pumps, compressors, fans, blowers, and similar equipment. The oil-relayed governing system of the unit is claimed to provide for more efficient performance over previous models. The range of speed adjustment has been

increased to 30 per cent; the speed regulation has been reduced to 6 per cent. More parts are enclosed, and the governing system is completely encased in an oil atmosphere to eliminate rusting problems on standby service.

A balanced valve design is utilized for

Type 4U Floor Grinder—designed for utmost versatility in every type of plant.



Tool Post Grinder—furnished with and without slide adjustments for precision grinding.

For Tool and Production Work Hisey GRINDERS Heavy Duty Tex-Drive Seconds

• Whatever your product, there's a HISEY Grinder to meet production or tooling needs. From bench grinders to large grinders for heaviest continuous use, a HISEY Grinder means efficient, low-cost service. The complete HISEY Line is illustrated and described in Catalog 70 AR. Write for your free



THE HISEY-WOLF MACHINE CO.

Div. of Smith & Mills Co. CINCINNATI 25, OHIO the governing valve and the combined trip-throttle. With this design, a minimum force is required to operate the valves and a given size valve can handle larger steam flows, it is claimed. The valves are combined in one assembly.

Maintenance of the G.E. Type DP Mechanical-Drive Turbine is facilitated by the accessibility of individual components such as the oil cooler, oil pump, and steam and oil strainers. The majority of parts are interchangeable on all Type DP frame sizes. Spare parts kits, with parts applicable to these standard turbines, are available.

High Speed Cutting Tools

 Special high speed circular, dovetail, flat form and special tool bits.
 Design and manufacture of small machines, figs, gages and experimental parts.
 Regrinding and salvaging high speed flat form, special bits and small flat broaches.

Write for quotes.

Attractive Proposition for Representatives

LINCOLN PARK MANUFACTURING CO.
3304 Dix Road Lincoln Park, Mich.



Doerr Type C Fan Motor

Electro Machines Inc., Dept. MMS, Cedarburg, Wis., announces the addition to its Doerr line of standard and special fractional horsepower motors of a permanent split capacitor type fan motor incorporating several features which are



Doerr Type C Fan Motor

said to provide for quiet performance and long trouble-free life. Designed for use on direct-connected fans and blowers, the motor, which is designated as the Type C, is totally enclosed in a rugged steel housing and is equipped with lifetime lubricated ball bearings. Optional features include a built-in two-speed pull chain switch and a short cord for plug-in connection brought out of the frame.

Available in ratings from 1/20 to % h.p., the Doerr Type C Fan Motor can be furnished with extended through bolts, standard welded foot construction, removable bolted-on base, or frame drilled to meet special mounting requirements. The motor is also available with a separately mounted switch for two-speed operation on 115/230 volts, a.c. in powering unit heaters, fans, and ventilators.

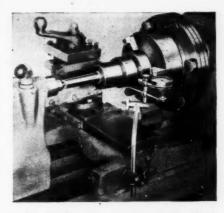


Chapin Auto-Truer Automatic **Truing Attachment**

An automatic truing attachment adaptable to toolroom and production lathes, lesignated as the Auto-Truer, has been placed on the market by the Chas. E. Chapin Co., Dept. MMS, East Rutherford, N. J. Attaining cencentricity as low as 0.00001 inch in a matter of seconds, the attachment, it is claimed, is designed for use with universal self-centering chucks, independent chucks, faceplates, and special fixtures.

The Auto-Truer is made of Meehanite castings with ground surfaces. All bolts, washers, and bushings are hardened and ground. The unit consists essentially of a back plate 5, 714, or 9 inches in diameter threaded to fit the lathe spindle, and a radially movable front plate, of the same diameter, threaded exactly as the lathe spindle to accommodate the chuck. The front and back plates are locked together by a clamping ring which, by means of three hex locking bolts entering from the front plate, acts as a vise to lock the front plate and chuck in alignment after concentricity has been obtained.

To place the Auto-Truer into operation, the unit is screwed onto the lathe spindle. The chuck or faceplate is then screw-



Chapin Auto-Truer Automatic Truing Attachment Mounted on Lathe with Chuck and Workpiece Prepared for Operation

ed on the spindle of the Auto-Truer front plate. The workpiece is placed in the chuck or faceplate and three hex locking bolts are loosened. When unlocked, the front plate is held in frictional contact with the back plate by means of springs,



For complete information, write to: Engineering Department, Thriftmaster Products Corp., 1048 N. Plum St., Lancaster, Pa.

Detroit (21) E. B. Parish Company Pittsburgh (3) Voss Machinery Co. Boston (16) A. R. Shevlin Company Philadelphia (40) Wright & Gade Tool Co. Indianapolis, R. L. Guimont Co. Chicago (7) Gatz-Arnold Company Cleveland (12) T. J. Fraser Tool Supply Co.

Multiple Spindle U FIXED AND ADJUSTABLE CENTERS

thus permitting the front plate to move radially with relation to the back plate.

Running the lathe at about 600 r.p.m., the cross feed is operated to bring the follower into contact with the work. Applying pressure against the workpiece until it is slightly beyond center, the follower is then backed away as slowly as possible. When the hand indicator stands still centering is completed. The lathe is then stopped and the three hex locking bolts are tightened to prevent shifting of the chuck or faceplate unit.

Crown "E-Z Mark" Etcher

The Crown Industrial Products Co., 1521 E. 53rd St., Chicago 15, Ill., announces a marking instrument for electrolytically etching on metal trade marks, part numbers, product or owner's name, or any other device that can be typed, written, or drawn on a 2½ x 6%-inch stencil film. Known as the "E-Z Mark," the small etcher, which uses no acids, is said to permanently mark steel, brass, copper, alloys, magnesium, zinc, bronze, tin, cadmium, and other metals.

With the etcher, a single stencil can be used for marking several hundred flat or round pieces. The operation consists of placing the piece to be marked on the film stencil and pressing a button on the etcher. Switches are provided for con-

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Crown "E-Z Mark" Etcher

tinuous operation or single-piece marking.

The Crown E-Z Mark Etcher is readily portable, with self-contained rheostat



and ammeter, and measures $9 \times 11 \times 7\%$ inches in size. It is available in models for 115 or 230-volt a.c. operation.

Pannier "Master Marker" Automatic Printing Machine

Sheet and strip marking at a speed of up to 2,000 feet per minute and a complete die change in 30 seconds are said to be possible with the "Master Marker" Au-



Pannier "Master Marker" Automatic Printing Machine

tomatic Printing Machine announced by The Pannier Corp., Dept. MMS, 202 Pannier Bldg., Pittsburgh 12, Pa. The device is designed to print all materials of any thickness.

Mounted and positioned on an overhead crossbar by adjustable set-screw collars, the Master Marker is motivated by a friction-drive Alemite-lubricated roller bearing wheel with a 35,000-mile-life rubber tire. The wheel is driven by either the product or conveyor (wheel need not ride on product) at production speed. A full counterweight is mounted on the wheel axle to provide for accurate balance.

The Pannier Master Marker Automatic Printing Machine is said to retain the same type of brass-back dies used in previous equipment. The complete die is held by a simple spring pin for quick and easy changing. One or two dies may be used—at any spacing required. Die pressure is adjustable and is said to remain constant



This Amazingly Fast Drill Press Vise May Also Be Used as a Base Structure for Jigs & Fixtures.

This unique screwless vise provides instantaneous, effortless setting. Patented gripping mechanism guarantees positive locking. Wide clearance between guide bars permits clearthrough drilling. Built-in parallels save leveling time. Write for folder.

HANDNIB No. 5 for

✓ Outside Nibbling
✓ Inside Nibbling

√ Shearing

V Punching



A five-in-one "handyman" which nibbles (outside and inside), shears, punches and cuts rods. Eliminates hours of tedious hand - work. Quickly, easily cuts templates and trial blanks in any desired shape. Takes up to \%" flat stock. Also \%" round stock. Write today for illustrated folder.

NATIONAL MACHINE TOOL COMPANY
DEPT. 118-G • RACINE, WISCONSIN

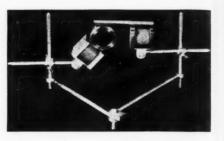
despite product irregularities. The felt ink roll has enclosed bearings, is inked from the face, and is adjustable to die thickness.

"Minute Man" Magnetic Welding Positioner

Designed to provide a quick and easy means for the welding of small parts or pleces, a welding positioner consisting of a simple sturdy V-frame equipped with two powerful permanent Alnico magnets is now being marketed under the trade







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July

"Minute Man" Magnetic Welding Positioner

name of "Minute Man" by The du Mont Corp., Dept. MMS, Greenfield, Mass. With the unit, two or more pieces of ferrous metal can be gripped and held in virtually any position for welding, soldering, or other joining operation.

The accompanying illustration shows the positioner being used to hold a 3-inch collar and %-inch shaft. The magnets of the welding positioner are each 2 x 2 x 2½ inches in size with equal holding power on all four sides. They are mounted universally on the positioner frame, which has two horizontal arms 10 inches long and two vertical arms 6 inches long. The distance between the arms can be readily varied, as well as the height of the horizontal arms. The frame has a spread of 18 inches. A ground clamp may be attached to a pad at the pivot point.

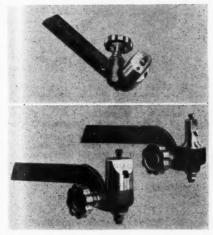
A small auxiliary chuck is supplied with the Minute Man Magnetic Welding Positioner for holding pieces that present unusually small surface areas. The positioner may be used for brazing non-ferrous materials by employing C-clamps which are, in turn, gripped by the magnets. The permanent magnets are detachable and may be used for other purposes such as retrieving steel parts from dipping or plating tanks, collecting steel particles from grinder coolant tanks, etc.



July, 1948

Monarch "Shaplane" Radius Tool

For tool and die shops, jobbing machine shops, and large plants with extensive toolrooms, C. B. Teeter, Dept. MMS, 4470 Oakenwald Ave., Chicago 15, Ill., is introducing the Monarch "Shaplane" Radius Tool, which is made in four models for lathe, shaper, planer, and boring mill use. Simple to operate, the tool is said to cut an accurate radius from 1 to 3 inches on a shaper or planer and to cut partial radii on a boring mill, such as ball bearing races, end thrust collars, and so on.



(Above) Monarch "Shaplane" Shaper and Planer Radius Tool. (Below) Monarch "Shaplane" Engine and Turret Lathe Radius Tools

Two sizes of the tool are available for cutting concave radii from ½ to 3 inches on engine or turret lathes. A convex cutter model is also available which is designed to turn an accurate ball from ¼ to 2½ inches in diameter.

The shank and body of the Monarch Shaplane Radius Tool is a one-piece alloy steel casting which fully encloses the bearings and gears, thus protecting them against the entrance of chips, grit, or foreign matter. The construction of the tool is said to eliminate all strain from the worm and worm gear and permit heavy cuts to be taken without damaging the tool. All necessary adjustments are provided for take-up or wear. When set with a micrometer, the Shaplane, which uses one standard tool bit for all sizes of radii, is claimed to ensure the production of an accurate radius with an extremely smooth finish.



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Send blueprints or sample assemblies of your work for analysis. We will give quotations and recommend the proper HIGH SPEED Riveting Hammer to do the job right . . . and fast.

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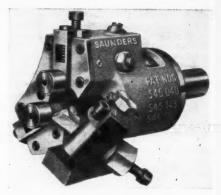
THE HIGH SPEED
HAMMER COMPANY, INC.

307 NORTON ST. ROCHESTER S. N. Y.

Saunders Roller Box Tool

A unique roller box tool having simple adjustments which enable unskilled labor to be quickly and easily trained to set and supervise their own jobs is now being marketed under the trade name of Saunders by the International Trade Relations Agency, Inc., Industrial Division, Dept. MMS, 832 Washington Bldg., Washington 5, D. C. Outstanding features of the tool include spring compensators which provide for pressure of the rollers on work; double-roll ball bearing rollers which, once set for one diameter, are said to be set for all diameters; self-centering





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Saunders Roller Box Tool

and self-aligning design that is claimed to rectify any error in the machine and eliminate distortion; and tool post with tangent tool having simple adjustments in every direction with micromatic accuracy and powerful lock.

With the Saunders Box Tool, the rollers move to and from the center simultaneously under the action of a hardened and ground cone. Thus, once the rollers have been set for one diameter, they can be quickly reset to any other diameter without the need for skill on the part of the setter. The cone has an internal thread which fits the thread on the front end of the shank so that rotation of the cone causes it to move forward or backward. This movement, in turn, causes the roller slides to move toward or away from the axis of the workpiece simultaneously. The individual rollers are selfcompensating on their supporting slides so that when the Allen screw on the end of each roller spindle is loosened, the roller and its support move forward under the influence of a spring.



1" in diameter. Write today for new complete burring folder. NOBUR MANUFACTURING COMPANY

717 North Victory Blvd.,

Burbank, California

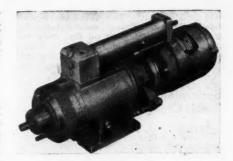


The Saunders Roller Box Tool is available in two models. Model No. 1 has a 1-inch shank and ¼ to 1-inch cutting range and weighs 8 lb. Model No. 2 has a ¾-inch shank and ¼ to ¾-inch cutting range and weighs 3 pounds.

Cleveland Republic Drill Unit

Production drilling, it is claimed, can be performed in any position, angle, or plane by means of an air-hydraulically operated drill unit developed by the Cleveland Republic Tool Corp., Dept. MMS, 1265 Union Commerce Bldg., Cleveland 14, Ohio. The drill unit, which is made in two models, can be used as a single unit or combined with several units for simultaneous operations. One model, the 250, can be used to drill ¼ inch in steel while the other model, the 500, is suitable for drilling ½ inch in steel. Moreover, each model may be used not only for drilling but also for milling, riveting, chamfering, slot sawing, and spotfacing.

The Cleveland Republic Drill Unit features a rapid approach and variable feed arrangement which allows the tool to come within 0.001 inch of the work, at which point the work feed automatically

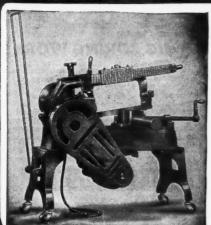


Cleveland Republic Drill Unit

cuts in smoothly and without hesitation, it is claimed. The drill unit also includes a micrometer adjustment and lock screw to control the depth of drilling, countersinking, and chamfering to tolerances of less than 0.001 inch.

The motor and operating mechanism of the drill unit are totally enclosed to prevent the entry of dirt, chips, or coolant. Only four moving parts are incorporated in the unit, these parts operating in a bath of oil. Ample bearing support to the spindle is said to enable runouts to be

SAWMASTER HACK SAW



LOW PRICED

PORTABLE

SELF-CONTAINED

READY TO WORK

Angle Cutting Vise

STURDY

ECONOMICAL

Write for Bulletin No. 300

MILLER-KNUTH MFG.CO. OMAHA, NEB.

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held to 0.0005 inch. The unit can be provided with a hand, foot, semi-automatic, or fully automatic control and may be attached to present machines by brackets. Special machines incorporating the standard drill units can also be obtained.

Springfield "TriSet" Direct Reading Cross-Feed Micrometer Dial

To make lathes as productive and convenient to operate as possible, The Springfield Machine Tool Co., Dept. MMS, Springfield, Ohio, has developed a direct reading micrometer cross feed dial to be known as the "TriSet." With the dial, any one of three individual direct readings may be selected for turning, boring, or depth of cut. All three direct readings are combined in the one indicator which is conveniently located so that the desired setting can be made quickly, easily, and accurately.

Direct readings in thousandths of an inch are provided through individual windows selected by means of a knurled ring at the front of the indicator housing. For maximum simplicity and accuracy, only one window with one set of gradua-



Springfield "TriSet" Direct Reading Micrometer Cross Feed Dial Installed on a Lathe

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tions is exposed at any one time. Transposition of readings is eliminated. Each of the three direct readings for outside diameter, inside diameter, and depth of cut is provided on the one dial through its own individual window. All other gradu-



SPECIAL MACHINES BUILT TO ORDER We have specialized in building machines and parts to our customers' drawings for 36 years. Send your blueprints for prompt estimates.

HARTFORD SUPER-SPACER

for JIG BORING WORK

Here the Super-Spacer is demonstrating another of its advantages to any tool room. Equipped with a face plate for exact location of work, it can be used on your jig borer to save indexing time, and production cost per piece. The Super-Spacer takes milling, drilling, grinding, planing, slotting, boring and other operations in stride. Investigate its benefits to your shop. Write Dept. S-6.



THE HARTFORD

SPECIAL MACHINERY CO.

HARTFORD 5, CONN.

ations are completely hidden while the operator selects and sets the direct micrometer reading for the work the lathe is to perform.

The TriSet Micrometer Cross Feed Dial is available on all new Springfield lathes and may also be installed on many older

models now in use.

Chicago-Lathrobe Type No. 1750 Harduty Drill

Designed for use in hardened die steel or similar case treated steels, a carbidetipped drill designated as the Type No. 1750 Harduty is announced by the Chicago-Latrobe Twist Drill Work, Dept. MMS, 411 W. Ontario St., Chicago 10, Ill. According to the manufacturer, the main purpose of the drill is to enable parts to be drilled after they have been hardened

without annealing. The Chicago-Latrobe Type No. 1750 Harduty Drill has a hardened high speed body and a relatively long carbide tip, thereby permitting many regrinds. The point of the drill is said to include the proper negative rake angles to prevent chipping and also to assist in dissipating heat. The drill is manufactured in diameters from a up to and including % inch

in de-inch increments.

Buckeye "Stream-Power" **Pneumatic Tools**

A line of pneumatic tools known as "Stream-Power" has been introduced by the Buckeye Tools Corp., Dept. MMS, Dayton, Ohio. The line comprises the following basic tools with a number of models in each classification: horizontal grinders weighing from 1 to 12 lb. with wheel capacities from ½ to 8-inch diameter and speeds from 3,000 to 22,000 r.p.m.; vertical grinders and sanders weighing from 10 to 12 lb. with speeds from 3,000 to 6,000 r.p.m. and grinding wheel capacities from 4 to 6-inch diameter and sanding pad capacities from 5 to 9-inch diameters; shears weighing from 3 to 6 lb. with up to 14-gauge maximum capacity; nibblers weighing from 21/2 to 4 lb. with up to 20-gauge maximum capacity; air wrenches weighing from 3 to 6 lb. with up to %-inch nut capacities; and reversible drills and screw drivers weighing from 3 to 5 lb. with up to %-inch drill and 4-inch screw driver capacities.

Features claimed for the Buckeye Stream-Power Pneumatic Tools include minimum weight, compact size, good bal-

IT PAYS OUT!



EXCEL No. 6 Cutter and Tool Grinder

The No. 6 pays out fast! Low price, and time-saving simple controls and set-up, make this precision machine ideal for smaller shops.

To larger shops, the No. 6 adds a lot of tool maintenance in very little space. It does work usually assigned to larger, more costly machines. Available accessories adapt the No. 6 to many machining operations including cylindrical and internal grinding.

PRICE

F.O.B. Benton Harbor. Michigan PEDESTAL MODEL WITH MOTOR

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EXCEL UNIVERSAL CUTTER AND TOOL GRINDER

Manufactured by COVEL MANUFACTURING COMPANY

BENTON HARBOR

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Buckeye "Stream-Power" Pneumatic Tools: (A) Air Wrench, (B) Reversible Drill and Screw Driver, (C) Shear, (D) Nibbler, (E) Horizontal Grinder

once, quiet operation, simplified maintenance, direct air flow, ease of lubrication, and easy operation. Material and construction features comprise governor controls, Neoprene valve seals, oil bearing end plates, magnesium alloy castings, labyrinth-seal bearings, stainless high carbon alloys, Heli-Coil threaded inserts, Tru-Arc retaining rings, and self-locking drive pins.

Landis Style LL Receding Chaser Collapsible Tap

The Landis Machine Co., Dept. MMS, Waynesboro, Pa., has developed an improved receding chaser collapsible tap designed primarily for tapping tapered threads. Designated as the Style LL, the tap is adjustable for thread length and can be used for American tapered pipe

threads or for any line pipe, tubing, casing, or drill pipe threads listed in the A.P.I. Standards providing these threads are within the diametrical capacity of the tap.

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All operating parts of the Style LL tap are made of steel. Those parts

subject to wear which may affect accuracy or efficiency are heat treated or hardened and then precision ground. The tap is of sturdy construction with an unusually rigid chaser support. The receding action of the chasers is accomplished through a fulcrumed lever principle. The callapsing action of the tap causes the chasers to drop into the tap head at the completion of the thread, thus freeing the chasers from the work and permitting the direct removal of the tap without reversing it or "backing out."

The chasers of the Style LL tap are arranged to recede into the tap head at a rate equal to the taper being produced. According to the manufacturer, cutting strains are low and uniform and, as a result, chaser life, in addition to the thread accuracy and finish, is materially improved. An outstanding feature of the tap is the detachable head which permits the use of tap heads of various sizes and

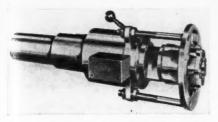
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We have:

ONE, FOUR and SIX spindle automatics maximum capacity 25%" round. Hand Screw Machines and Universal Turret Lathes maximum capacity 3" round. Castings and Forgings machined maximum 10" diameter, 8" length, 15 pound weight. Secondary operation equipment for milling, drilling, tapping and assembling. Fabricators of aluminum, brass, steel and their alloys.

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SCREW MACHINE SPECIALTY CO., • 5700 Butler St., Pittsburgh 1, Pa.



Landis Style LL Receding Chaser Collapsible Tap

capacities on the same tap body. This design enables a wide range of thread sizes to be covered with a minimum amount of equipment.

The Style ALM head is an improved modification of the Style LM head formerly used. Beginning with the 3-inch size, up to and including the 12-inch head, an even number of chasers is used, irregularly spaced in the circumference of the head. This means that no two chasers are directly opposite each other, thus providing maximum rigidity for the tap in the hole being tapped. The unusual rigidity permits the use of maximum radial clearance on the chasers, thus

providing free cutting action, with resulting increased chaser life.

The Landis Style LL Tap may be used as a stationary or rotary tap and can be converted readily from one type to the other. Left-hand threads can be cut by using a Style LM head with left-hand chip clearance and left-hand chasers. The Style LL head tap body is made in four sizes to cover a range of nominal pipe sizes from 1 up to and including 12 inches.

Transa Portable Gun Type Saw

Featuring a stroke adjustment of from 0 to 2 inches, thus allowing for the sawing of metals and other materials of various degrees of hardness and thickness, the Transa Portable Gun Type Saw illustrated herewith is now being manufactured by Transa, Inc., Dept. MMS, Suites 440-445, Gateway Bldg., Minneapolis 1, Minn. The design of the tool includes an attachment consisting essentially of a housing and barrel. The gearing comprises a unique application of worm and wormwneer wherein the saw blade receives double the power on the cutting stroke. The saw is arranged to cut on the return stroke, thus making it

For ACCURATE RADIUS GRINDING

Use this "K-O" Fixture

Handles cutters 16 "to 10" dia. Grinds convex or concave radius. 180° swing. Adaptable to any tool and cutter grinder. Mail coupon TODAY for complete details.



Aberdeen. South Dakota



K. O. LEE CO., 1114 First Ave. S. E.,

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easy for the operator to bear upon the work. The gears are precision cut and operate in a special type of grease which is said to ensure little wear and long life. Tolerances are held to very close limits in all parts of the attachment, which utilizes precision bearings, as well as Oilite bearings, to ensure long life.

The Transa Portable Gun Type Saw is powered with a motor built to company specifications, and includes a 2,500 revolution per minute drill that is said to be capable of driving a %-inch capacity drilling tool in steel. The drill has a special spindle locking device that facilitates dis-



Transa Portable Gun Type Saw

connection of the attachment, which can also be used with any other drill of suitable size, and revolutions per minute.

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An outstanding advantage of the Transa Gun Type Saw is the fact that it can be swiveled 180 deg., thus facilitating cutting in any direction. Useful for manufacturing, installation, and maintenance work in practically every field of endeavor, the tool is designed to utilize ½, ¾, and 1-inch hack saw blades which are held rigidly in position by interchangeable guides that can be quickly changed from one size to another. If desired, the tool can be used as a filing machine since it is readily adaptable to various sizes and types of files.

HOBBING PRESS

Capacities 30 to 400 Tons

- Low Cost Operation
- Self-Contained
- Sturdily Built
- Prompt Delivery

Prompt response—absolute control of moving parts for precision blanking, forming, drawing, shearing, and other uses.

Ready to operate — just hook electrical connection to your power line. Minimum floor space.



Door removed showing interior

Special M & N Hydraulic Hobbing Presses built to your specifications. Write for catalog on standard M & N presses.

Hydraulle Division

M &N Machine Tool Works, Inc.
144 Orene St. Clifton, N. J.

Bridgeport No. 1 Boring Head

Especially designed for boring with Bridgeport turret milling machines or Bridgeport high speed milling attachments but said to be equally efficient when used with other types of machines, the Bridgeport No. 1 Boring Head shown in the accompanying illustration is now being produced by Bridgeport Machines. Inc., Dept. MMS, 643 North Ave., Bridgeport 6, Conn. The head has a diameter of 2½ inches and a slide adjustment of % inch. Three holes for %-inch diameter boring tools are provided, two parallel with and one at right angles to the shank,

TO INCREASE PRODUCTION AND TO IMPROVE EFFICIENCY USE

BUTTERFLY FILING AND DIE MAKING MACHINES

This is a powerful machine for heavy or small precision work in use all over the world: Airplane Factories, Ammunition Plants, Toolrooms where fast production is desired. 4 Models, No. 16, No. 14 "EL" and Model "D." The larger the Model, the bigger the stroke and therefore more filing is performed. Furnished with a without pedestals. Constructed as per specification of U. S. Naval Aircraft Factories.

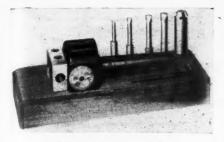
HARVEY MFG. CORP.

161 Grand St., New York,

296

Phone Canal 6-5170





Bridgeport No. 1 Boring Head

thus affording a range of more than 5 inches.

The Bridgeport No. 1 Boring Head is supplied complete with five boring tools and necessary wrenches mounted in a wood block, as shown in the accompanying illustration.

Brown & Sharpe End Mills

The Brown & Sharpe Manufacturing Co., Dept. MMS, Providence 1, R. I., announces the addition of eight new styles to its line of end mills. These include a

long, fast spiral single-end end mill with straight shank in sizes from 1/4 to 2 inches in diameter; extra long, fast spiral single-end end mill with straight shank in sizes from ¼ to 1¼ inches in diameter; fast spiral double-end end mill with 18-inch straight shank in sizes from to a inch in diameter; long fast spiral double-end end mill with 3-inch straight shank in sizes from 1 to 1 inch in diameter; long, two-flute fast spiral single-end end mill with straight shank in sizes from ¼ to 1 inch in diameter; two-flute fast spiral double-end end mill with 3-inch straight shank in sizes from 16 to 16 inch in diameter; long, twoflute fast spiral double-end end mill with 3-inch straight shank in sizes from to to inch in diameter; and ball end, twoflute fast spiral single-end end mill with straight shank in sizes from 1/8 to 1 inch in diameter.

In addition to the new style end mills, the company has also increased the range of sizes in which some of its other end mills are furnished, as follows: fast spiral single-end mill with straight shank in sizes up to 2 inches in diameter; fast spiral double-end mill with straight shank in sizes up to 1 inch in diameter; two-flute fast spiral single-end end mill with straight shank in sizes up to



"In gaging precision holes, from machine to inspection, we find Comtorplugs best combine accuracy with ruggedness."



FULLY ILLUSTRATED

With the same interchangeable amplifier fitting expansion plugs from "" to 8" dia., Comtorplug provides a gage of "Shop ruggedness. with laboratory accuracy Automatic features of selfcentering and self-alignment assure positive accuracy in gaging bores to readings within a fraction of .0001". Not a passing reading. Actual size of hole is shown on dial. Automatic 2-point contact. Shows actual diameter, and detects front or back taper, out - of - round, bell mouth, barrel shape, etc. Gages the work while still in the chuck. Different opera-

BULLETIN 33 tors always get the same reading. If you produce precision holes in quantity, by all means investigate Comtorplug.

COMTOR CO

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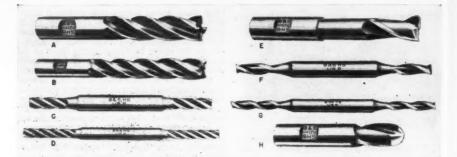


MACHINE OPERATOR



INSPECTOR

Other Comtor Products:
"COMTORGAGE," Precision External Comparator: Bulletin 30 COMTOR SURFACE SMOOTHNESS COMPARATOR: Bulletin 32A



(A) Long, fast spiral single-end end mill; (B) extra long, fast spiral single-end end mill; (C) fast spiral double-end end mill; (D) long, fast spiral double-end end mill; (E) long, two-flute fast spiral single-end end mill; (F) two-flute fast spiral double-end end mill; (G) long, two-flute fast spiral double-end end mill; and (H) ball end two-flute fast spiral single-end end mill

2 inches in diameter; and two-flute fast spiral double-end end mill with straight shank in sizes up to 1 inch in diameter.

Palmgren No. 320 Drill Press Vise

The Chicago Tool and Engineering Co., Dept. MMS, 883 S. Chicago Ave., Chicago 17, Ill., announces the addition of a drill press vise, designated as the No. 320, to its Palmgren line of machine vises. Accurately machined of semi-steel gray iron castings, the vise includes 3-inch wide jaws having a depth of 1½ inches and which can be opened 3 inches. The steel jaws are of the removable type and are opened and closed by means of an Acme thread screw.

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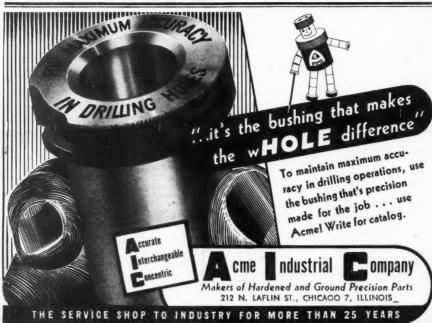
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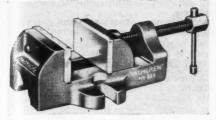
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The Palmgren No. 320 Drill Press Vise



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Palmgren No. 320 Press Vise

is provided with side lugs for convenience in bolting to machine tables and is recommended for use on drill presses, milling machines, grinders, and other machine tools.

Bradford "Triple Tool"

Known as the "Triple Tool," a portable electric tool which can be converted from a 5-inch disc sander to a polisher or to a ¼-inch drill is now being manufactured by The Bradford Machine Tool Co., Dept. MMS, 657 Evans St., Cincinnati 4, Ohlo. The design of the tool allows for removing of the backing pad for sanding or polishing and substituting a 7B Jacobs chuck for drilling operations. Thus, the tool can be used for light or intermittent sanding, polishing, or drilling of metal, plastics, and wood. The drill capacity is ¼ inch in steel and ½ inch in hardwood. The sanding discs and wool polishing bonnet are each 5 inches in diameter.

The Bradford Triple Tool has a net weight of 6 lb. and is compactly constructed to provide for easy handling in any position, especially in close quarters.

Bradford "Triple Tool"



AUTOMATIC STAKING MACHINE



For eyeletting, inserting grommets, burring, and pointing with platinum, tungsten or silver — in addition to staking and riveting operations. Uniform blow, foot treadle operation, adjustable hammer blow, safety features. Made in 3 sizes.

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THE HIGH SPEED
HAMMER COMPANY, INC.
RIVETING MEADQUARTERS
307 NORTON ST. ROCHESTER S. N. Y.

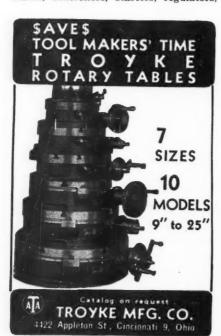
The rear pistol-type grip encloses a trigger switch and push-button spindle lock for quick and easy removal or replacement of sanding discs, backing pad, and drill chuck. The motor is a 115-volt a.c.-d.c. type which drives the disc at 2,300 r.p.m. free speed and at 1,400 r.p.m. under normal load. Ball bearings with sealed-in lubrication and hardened helical cut gears are used throughout. A cast aluminum housing encloses the entire unit.

The Bradford Triple Tool is furnished complete with three 5-inch sanding discs (fine, medium, and coarse), one 5-inch lamb's wool bonnet, one 5-inch backing pad, one 7B Jacobs chuck with key and keyholder, and 10 feet of rubber-covered

3-conductor cable with plug.

Rotol Liquid Formula

Rotol, a liquid formula for cleaning all forms of electrical contacts, has been introduced by the Rotol Chemical Co., Dept. MMS, 58-21 80th St., Elmhurst, Long Island, N. Y. According to the manufacturer, the product thoroughly and safely dissolves dirt and waste that accumulates in commutator slip rings, contact tracks, controllers, starters, regulators,



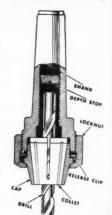
cell switches, and all forms of electrical contacts.

Rotol is non-inflammable and gives off no poisonous fumes, it is claimed.

Drewco Collet Chuck

A precision collet chuck in which collet alignment and collet centering are separate functions is now being marketed by

the Drewco Corp., Dept. M M S, 1600 Junction Ave., Racine, Wis. Referring to the crosssectional drawing herewith, at the large end of the collet taper is a transverse face ground against the inner shoulder of the shank recess which, being square with the shank axis, is said to result in parallel alignment of the collet and shank. The cap is placed on the collet and pushed into the recess, thereby automatically and positively centering the



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Drewco Collet Chuck

collet. The lock nut causes the collapsing collet to grip the tool shank with a great force. The cap is carefully engineered so that sufficient elasticity is present to compensate for an unusual amount of aper on the tool shank being gripped. In addition, the almost complete containment of the collet in the cap is said to assure a minimum of distortion error due to twist in the collet itself.

On removing the tool from the chuck, the lock nut is backed off approximately

Save Time With RADIUS DRESSER

Thousands of Somerset Dressers in service. Offer outstanding features —Wheel is dressed from below, avoids removal of guard. Stoppins permit rotation thru 180° or 90° either direction. Wearever bearing is dustproof.



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TOOL CO.

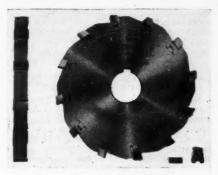
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three turns by hand, thereby causing the cap and collet to move away from the recess shoulder. The tool may then be removed by finger pressure. The release dip joins the lock nut and cap into a single unit for efficient handling. The chuck shank and lock nut are provided with wrench flats for positive tightening by means of standard wrenches.

An outstanding advantage claimed for the Drewco Collet Chuck is the fact that the collet is stationary, thus enabling the end of he collet to be used as a stop for presetting tools. Each collet used in the chuck is said to have a range of at least 0.035 inch. The chuck design is claimed to prevent excessive collapsing and therefore breakage or deforming by accidentally placing the wrong size of collet in the chuck.

"Varicut" Carbide Side Milling Cutter

A simple inserted blade cutter for side. straddle, or slot milling is now being manufactured under the trade name of "Varicut" by the Wesson Co., Dept. MMS, 1220 Woodward Heights Blvd., Ferndale 29, Mich. The tool may be used



"Varicut" Carbide Side Milling Cutter

as a side, half side, plain, or staggered tooth milling cutter by merely inserting different types of blades. For different materials various grades of Wessonmetal carbide are available.

The Varicut Carbide Side Milling Cutter utilizes blades which are angular on the bottom slots to accomodate tapered wedges for driving the dovetail shapes up into the dovetail body slots. The blades are said to be quick and easy to assemble and disassemble and can be



MODEL 650-61/2" stroke, 1 4" tool hole capacity.

MODEL 651-61/2" stroke. I" tool hole capacity.

MODEL 425-41/4" stroke. 1" tool hole capacity.

FOR ALL LATHES FROM 9" TO 16" SWING

- All Bearing Surface Ground and **Hand Spotted**
- All Parts of Indexing Mechanism Hardened
- Hexagon Head Spring Loaded
- Full Begring Slide No Chip Interference
- Seasoned Castings • Twin Gear Drive for Repetitive Accuracy
- Dovetail Double Gib Construction Adjustable Front and Rear
- · Pilot Wheel for Sensitive Control • Turret Base Clear Lathe Saddle Wings
- External Vise Grip Clamping

Also Mfgrs. of Enco Turret Tool Posts for All Lathes.

ENCO MANUFACTURING COMPANY and quotation giving make Chicago 39, Illinois of lathe and size.

readily replaced when broken without scrapping the cutter body. The cutter is available in diameters of from 3 to 8 inch and in widths ranging from ¼ to¾ inch.

Rex Boring Bar Holder

Intended for use in a square tool post on a turret lathe, a boring bar holder which is constructed to accommodate many different sizes of bars has been placed on the market by the Rex Manufacturing Co., Dept. MMS, 837 St. James Ave., Springfield 4, Mass. Designed to enable the user to obtain a high quality finish on his work and to reduce setup time to a minimum regardless of the size of bar being used, the holder includes an eccentric or cam action barrel which provides for placing of the bar in the correct working position quickly and also parallel with the axis of the work. In this manner, a bar of the correct size can be readily used. An extremely firm grip is said to be provided on the bar, thus reducing vibration or chatter to a minimum and enabling precision finishes to be ob-

The Rex Boring Bar Holder is made



Rex Boring Bar Holder

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of alloy steel and has a bar capacity of up to 1 inch. However, by the application of a special barrel, bars up to 1¼ inches in diameter may be accommodated.

Your Hardness Tester...

Dependably accurate "Rockwell" testing results are obtained only when every part of your hardness testing equipment is made to precision limits. That is why a correctly designed diamond penetrator is of such great importance. Always specify CLARK Diamond Cone Penetrators, both for Standard and for Superficial "Rockwell" testing. They are accurately made to the proper size and shape; exactly formed by expert lappers. CLARK Penetrators are designed for use on all "Rockwell" type testing machines.

Standard "C" Diamond Cone \$18,00 F. O. B. Detroit INSTRUMENT, INC.

10200 Ford Road

Dearborn, Mich.

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National Carbide Drill

A carbide drill for use in drilling high speed steel registering as high as 66 on the Rockwell "C" scale is announced by the National Tool Salvage Co., Dept.



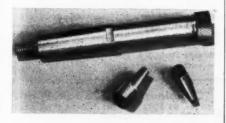
National Carbide Drill

MMS, 6511 Epworth Blvd., Detroit 10, Mich. The drill, it is claimed, incorporates a special grind which provides for unusually fast cutting and the generation of minimum heat, with the result that the tool has a long life and produces smooth holes true to size without annealing the work.

According to the manufacturer, holes 1 inch deep can be drilled in as little as 60 seconds with negligible wear on the drill.

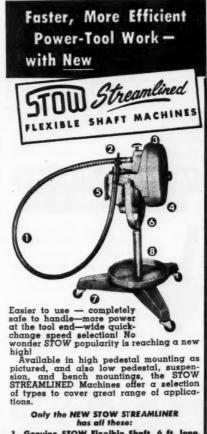
Severance Taper Mount Micro-Mill

For fast internal finishing operations. Severance Tool Industries Inc., 724 Iowa St., Saginaw, Mich., announces that its Micro-Mill is now available in sizes %



Severance Taper Mount Micro-Mills

inch and larger having tapered shanks. According to the manufacturer, a standard internal grinding spindle or quill can be adapted for the mounting of the Taper Mount Micro-Mill, with instant and positive alignment provided by mating two steel tapers and securing the Micro-Mill



 Genuine STOW Flexible Shaft, 6 ft. long. Tough heat-treated core, ¾" diameter. Durable, oil-resistant casing

2. Ball-bearing handpiece, with detachable wheel arbor.

- 3. Quick change in speed ratio: selection of four shaft speeds. Streamlined, guarded drive for protection
- to user and machine—better appearance.
- 5. Ball-bearing motor.
 6. Free-swinging pivot mounting.
 7. Ball-bearing casters for easy moving.
- 8. Handy tool tray.

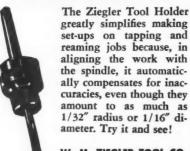
Check on this smooth-working, smooth-looking STOW at your supply house-or write for full description.



in place with the aid of a retaining screw.

Designed to size bores in one or two passes, the Severance Taper Mount Micro-Mill is available in nine standard sizes covering a range of diameters from % to 1½ inches. In addition to being applicable for the ordinary run of internal grinding work ranging up to Rockwell 62-C hardness, the tool is claimed to be ideal for post-hardening changes or alterations where large amounts of stock removal are involved. When necessary, the severance taper mount Micro-Mill may be economically reground.

TAPPING AND REAMING Simplified



W. M. ZIEGLER TOOL CO.

1928 Twelfth St., Detroit 16, Mich.



"Cristorch" Welding and Cutting Torch

A welding and cutting torch to be known as the "'Cristorch" has been introduced by The Hamilton Tool Co., Dept. MMS, Ninth St. at Hanover, Hamilton,



"Cristorch" Welding and Cutting Torch

Ohio. The torch includes a flexible head which can be revolved through an arc of 180 degrees, thus enabling it to reach hard-to-get-at places.

The Cristorch is designed to cut metal from ½ to 4 inches thick and to cut holes and circles from ½ to 30 inches in diameter with an accuracy to within ¼ inch. According to the manufacturer, the torch cuts countersunk holes and bevels one or both sides of a straight cut in a single operation. It can also be used for grooving operations and for cutting the heads from rivets and bolts without blemish to the surface of the work area.

In addition to the flexible head, the Cristorch also features a side-opening tip lock nut which is said to reduce to a minimum the time required for the insertion or removal of tips. One turn of the nut is claimed to provide for the release or tightening of the tip, which is inserted and withdrawn through an accurately milled side opening in the nut. The valves of the torch are all constructed as complete assemblies and may be easily removed from the body of the torch.



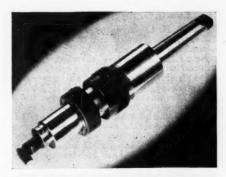
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Max-WELL-Made Jig and Fixture Type Recessing Tool

As an addition to its line of Max-WELL-Made precision tools, The Max-well Co., 325 Broadway, Bedford, Ohio, announces a jig and fixture type recessing tool designed for precision recessing operations where the tool must operate through jigs or fixtures. The tool is made in three sizes for machining diameters ranging from 1/2 to 21/8 inches. Tool No. 2 J.F. has a capacity from 1/2 to 1 inch; Tool No. 2 J.F., a capacity from 1/2 to 111 inches; and Tool No. 3 J.F., a capacity from 1/2 to 21/6 inches.

The Max-WELL-Made Jig and Fixture Type Recessing Tool is designed for piloting into standard bushings and can be operated in a manual or automatic feed spindle. The diameter of the recess produced is governed by actuating the stroke of the tool, which is set by adjustment of a stop collar when the tool is used in a manual feed spindle. The distance from the face of the work to the recess is controlled by adjusting a ball bearing stop bushing.

By releasing a combination positive lock and friction clamp, cutters can be interchanged, thus providing the tool



Max-WELL-Made Jig and Fixture Type Recessing Tool

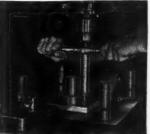
with a wide range of application. Various types of cutters can be used, such as ramultiple-groove, and numerous other cutters. In addition to cutters, tool shanks are also interchangeable. Shanks available include Brown & Sharpe, Morse taper, adjustable adapter, quick-change, and straight type shanks or special shanks to meet individual specifications.

The recessing tool includes parts which are hard chrome plated.

Lassy Universal Tap & Die Guide Fixture



Guide, removed from fixture, in use threading



Complets as shown with 12 Adapters

(Taps not furnished)

Capacity No. 5

Pipe taps to 3/8" Dies to 11/2" O.D.

This new, handy versatile tool is ideal for all hand tapping and threading. On the lathe tapping and threading can be

threading can be done under power. Large work is tapped right on the drill press without juggling it around. Attaches to wall or bench. $12\%'' \times 6\%'' \times 17''$; wt. 32 lbs. Send for free circular: "Short Cuts to Tapping and Threading."

Guide, removed from fixture, in use tapping

From your mill supply house or

LASSY TOOL COMPANY, 90 Bohemia Street, Plainville, Conn. COMPLETE LINE OF BENCH AND FLOOR TAPPING MACHINES

Lewthwaite Stock Pusher

The T. H. Lewthwaite Machine Co., 317 E. 47th St., New York 17, N. Y., announces a stock pusher which is said to provide for a positive forward feed of the rod without scarring the surface and is so designed as to allow the pusher to be retracted with a minimum of stress. With the pusher, tension on the stock feed operating mechanism is claimed to be relieved and friction heat eliminated.

The Lewthwaite Stock Pusher, which can be made for use on any standard screw machine, operates on a reverse taper principle. A set of smooth faced

jaws is held in light frictional contact with the rod by a circular spring. The outer surfaces of the jaws are tapered to match a taper in the holder. When the pusher is moved forward, the jaws are



Lewthwaite Stock Pusher

squeezed against the stock. The clamping pressure increases as resistance is encountered; however, when the pusher is retracted, the taper provides for instant release of the jaws and allows them to slide freely when urged by the retainer.

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MORE PROFITS FROM YOUR LATHE



STEP UP PRODUCTION

INSTALL a Newton Precision Bed Turret for maximum tooling on your Logan, Atlas or Craftsman Lathe. This self-indexing, self-head locking turret accommodates six tool positions. Adjustable gibs assure long-life and precision operation. Fast — smooth — easy to operate. Get greater production now — PRICE Write for free literature now. \$750.00 Dept. MM-6

A-K TOOL COMPANY

2029 Blake Avenue, Los Angeles, Calif.

Holo-Krome Dowel Pin

The Holo-Krome Screw Corp., Dept. MMS, Hartford 10, Conn., announces the addition to its line of products of a dowel pin with a black luster finish which is claimed to act as a lubricant, retard corrosion, and prevent rusting. According to the manufacturer, the lubricity of the pin allows it to be easily driven with a minimum of scoring of the pin and mating parts.

Made of H-K special analysis alloy steel, the Holo-Krome Dowel Pin is hardened, carburized, double precision ground, provided with its special black luster finish, and finally individually inspected. The pin is available in a complete range of standard sizes, as well as in special sizes on order. The various sizes of pins are furnished in sturdy specially designed boxes which permit easy handling and stocking and are sealed for the user's

For Your Convenience ...

the "Where to Get It" section of MODERN MACHINE SHOP, originated in February, 1940, provides a quick reference to machinery, tools and supplies advertised in the current issue. Use it consistently. You'll find it's very helpful. (See pages 336, 337 and 338.)

MODERN MACHINE SHOP



Holo-Krome Dowel Pins

protection. Positive identification at a glance of the contents of the boxes is said to be assured by distinctive black and yellow labels with quantity and sizes of pins printed in clear easy-to-read type.

"Precision" Porous Bronze Bearing Pillow Block

A porous bronze bearing pillow block is now being manufactured in shaft sizes of ½, %, ¼, ¼, ½, åt, and 1 inch by the Precision Products, Co., Dept. MMS, 815 Pryor St., S.W., Atlanta, Ga. The block is of rigid cast iron construction, with thrust faces and mounting surfaces accurately machined so that the unit may be installed from specifications.

The capillary action of the porous bronze bearing provides for feeding of oil to the shaft as needed and, with proper installation, oil drip is claimed to be eliminated. An internal oil groove machined in the housing serves as an oil reservoir and is said to assure many hours of continuous pillow block use

without attention.

"Precision" Porous Bronze Bearing Pillow
Block







inghouse, Remington Arms, Ford, Nash-Kelvinator, Northrup, LOOK FOR THESE MOTO - TOOL FEATURES

Douglas and other plants.

branches of the Armed Forces in far-flung repair bases . . . helped to set production records at General Electric, West-

Housing has "pencil-type" finger tip . Instant-action, wrenchless chuck . Oil-less, sealed trouble-proof bearings Patented automatic chuck lock pin . Oversize armature shaft, hardened, ground and polished . 110 volt, universal type (AC-DC) motor® Easily replaced commutator brushes About 27,000 R.P.M.; cuts cleaner . . . saves cutters . Sliding snap-type switch . Handy hanger hook . Cord protector . Sturdy, shockproof bakelite housing . Dustfiltered air-cooling system . Weighs only 13 oz. . . . shaped to fit the hand . Dynamically balanced for vibrationless operation.



SEE YOUR MILL SUPPLY DEALER. IF HE DOES NOT HANDLE MOTO-TOOL, WRITE THE FACTORY.

Carboloy All-Purpose Carbide-**Tipped Masonry Drills**

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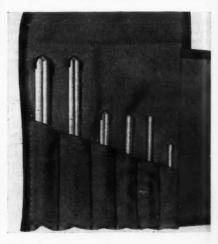
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An all-purpose line of carbide-tipped masonry drills, including both roundshank drills for shallow holes and fluted shank drills for deep holes, has been announced by the Carboloy Co., Inc., Dept. MMS, 11143 E. 8 Mile Blvd., Detroit 32, Mich. Both types of drills are said to be ideal for the rotary drilling of all kinds of masonry—concrete, brick, slate, plaster, marble, asphalt, limestone, and so on-and for a wide variety of jobs, includ-



Carboloy All-Purpose Carbide-Tipped Masonry

ing plumbing work, anchoring partitions, making telephone installation, sign hanging, and drill press work.

The round-shank drills are recommended for drilling comparatively short holes such as anchor bolt holes. The fluted-shank drills can be used for the same purpose, but are also said to drill holes as deep as the length of the drill shanks inasmuch as the flutes in the shanks permit the escape of the loosened material and prevent its "packing" in the holes.

The Carboloy Masonry Drills are available in three handy kits. Kit No. 1 contains six round-shank drills for shallowhole drilling ranging in diameter from to % inch. Kit No. 2, the universal kit for both shallow-hole and deep-hole drilling, contains three round-shank and three fluted-shank drills in six sizes ranging from 3 to %-inch diameter. Kit No. 3, a large size range kit for universal

drilling, contains two round-shank and four fluted-shank drills ranging in diameter from ¼ to ¾ inch. All kits are suitably tagged for quick identification.

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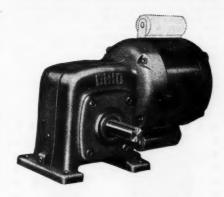
The drills are also available packaged individually or in quantities of the same size. The fluted shank drills are supplied in green-and-black boxes and the round-shank drills in red-and-black boxes for ready identification on tool shelves.

Ohio Motorized Speed Reducer

Available in capacities of ¼ and ⅓ h.p designated as the Series M-1400 and M-1300 respectively, a motorized speed reducer designed for long service is announced by the Ohio Gear Co., 1400 E. 197th St., Dept. 23, Cleveland, Ohio. Ratios range from 5:1 to 72:1; output from 317 to 24 r.p.m.; and output torque from 42 to 354 inch-pounds.

The housing of the motorized speed reducer is of special aluminum alloy. The worm gears are made of special gear bronze, selected for maximum strength with a minimum coefficient of friction. The worm and motor shaft are integral and are made of hardened steel and ball bearing mounted. The output shaft is of

extra heavy construction with ample bearing support. The output shaft roller bearings are mounted in cast iron covers,



Ohio Motorized Speed Reducer

and the input shaft bearing is mounted in a cast iron carrier cap.

The Ohio Motorized Speed Reducer is offered with two types of general purpose motors; namely, a capacitor type in

The new Balco Furnaces provide clean, scale-free hardening, gas carburizing, and carbon restoration of plain and alloy steels. This is accomplished by the accurate control of the

The Balco Furnace is a Standard-Rated, Gas-Fired Atmosphere Furnace of the muffle type with an integral RX atmos-

phere generator, and is available in three types-two for

clean hardening and one for gas carburizing. Of the former, one type has a temperature range from 2000° to 2400° F, the

other from 1400° to 1850° F. The range of the gas, carburizing,

The Balco Furnaces make available to the small furnace user

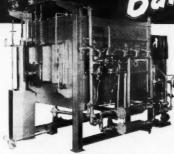
a multiple-purpose unit for clean hardening, gas carburizing,

carbon restoration and other carbon controlled heat treat-

ments. One such Balco unit in operation in a large commercial

heat treating plant has successfully processed 67 different





MOST OPERATIONS

• LEAST INVESTMENT

Write for full details and performance

figures.

Surface'

grades of tool steel.

Standard Rated FURNACES

SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO

carbon potential of the atmosphere.

furnace is from 1400° to 1850°F.

26340

July, 1948

MODERN MACHINE SHOP

309

115 and 230-volt designs and a threephase type in a 220/440-volt type design. Each motor is precision built and is of drip-proof construction. A cast-in terminal box permits easy wiring. Heavy duty ball bearings are used throughout the motor. A special feature of the motor is a Torq Syncrosnap starting switch which is said to ensure a precise snap action and eliminate damage through burned-out windings. With the capacitor type motor, the capacitor may be mounted above or below the motor according to the requirements of the user.



Monarch Precision SHAPLANE Radius Tools



For . . . LATHES, SHAPERS, PLANERS, BORING MILLS, ETC.

MIN. RAD. 1/2" to MAX. RAD. 21/2". MADE IN 3 MODELS.

C. B. TEETER

4470 Oakenwald Ave., Chicago 15, III.
Phone Drexel 3571

Super Wear Parts With Carbide Inserts

The production of wear parts with carbide inserts is announced by the Super Tool Co., Dept. MMS, 21650 Hoover Rd.

Detroit 13, Mich. The accompanying illustration shows acommercial stapler clinching die with carbide insert. Parts of this type, according to the manufacturer of the staplers in which they are used, have withstood continued use without wearing to the point where replacement is required.



Super Wear Part with Carbide Insert

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Various other shapes and sizes of wear parts with carbide inserts can be produced by the company in accordance with the specifications and requirements of the user.

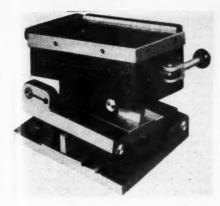
Magna-Sine With Permanent-Magnet Chuck

The Robbins Engineering Co., Dept. MMS, 318 Midland Ave., Detroit 3, Mich., announces that its Magna-Sine for precision angular setups on operations such as inspection, grinding, boring, and so on, is now available with a permanent-magnet chuck.

Designed for use in performing either wet or dry machining and grinding operations, the Magna-Sine with permanent magnet chuck is so constructed that the amount of magnetic power is controlled by the amount that the operating handle is turned. With the permanent magnet chuck, parts are not magnetized when rechuck, parts are not magnetized when re-



BREMIL MFG. CO. 1400 Pittsburgh Ave. Erle, Pa.



Magna-Sine with Permanent-Magnet Chuck

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moved from the chuck, it is claimed. Magna-Sines with electric magnetic chucks are also obtainable.

"Lite-Mite" Miniature Flourescent Magnifier

Designed to provide a compact combination of cool glare-free light and optically correct magnification to facilitate the performance of precision inspection, assembly, and machining operations, the "Lite-Mite" Miniature Fluorescent Magnifier shown herewith has been placed on the market by Stocker and Yale, Dept. MMS, 48 Birch St., Marblehead, Mass. Intense illumination of 350 foot-candles

"Lite-Mite" Miniature Fluorescent Magnifier



Speed Up Press and Shear Work!

LYON-Raymond SHEET & STRIP

FEEDING TABLE



Capacities of model illustrated: 4000 to 6000 lbs.

This table elevates load hydraulically — feeds sheet or strip at level of machine bed.

No Lifting
No Stooping
No Tugging

- 1. Levels Sheet or Strip Stock with Press Bed
- 2. Lessens Worker Fatigue
- 3. Increases Efficiency
- 4. Cuts Handling Costs
- 5. Serves for Feeding or Receiving
- 6. Portable, but Locks in Place
- 7. Has No Installation Cost
- 8. Facilitates Faster Feeding
- 9. Reduces Spoilage
- 10. Can Be Used for Die Handling
- 11. Made in Wide Range of Sizes

For loads of 2000 lbs. LYON-Raymond single pedestal type. Tilting top for inclined beds available.

10,000 lb. and 20,000 lb. capacity Sheet Feeding Tables (double cylinder type) also avail-

WRITE ...

Here's money-saving information on these shop-proved LYON-Raymond sheet feeding tables. Folder gladly sent, without obligation, on request.

LYON-Raymond CORPORATION

705 Madison St.

Greene, N. Y.

ROGERS

1885 - 1948

G R R E B 19 A D T E E R T 0 S E T E 0 ı T

THE JOHN M. ROGERS TOOL CORPORATION

GLOUCESTER CITY, NEW JERSEY

floodlights the objects from widely divergent angles, thus revealing all surfaces. Both eyes observe the object in fine detail through two power lenses mounted in the reflector between twin 5-inch fluorescent lamps. Since the point of observation is directly behind the light source, internal surfaces of holes and cavities can be seen with ease, it is claimed. A lamp surface temperature of 115 deg. F. is said to allow for close work with complete comfort.

The standard fixture has a black wrinkle exterior finish and baked white enamel reflector. The fixture measures 6½ inches long an weighs 10 oz. It is available with an easy-adjust chrome supporting bracket for machine and bench installations. The magnifier is designed for use with 4-watt lamps of standard manufacture which are rated at 2,500 hours normal life, and is intended for operation on 115 volts, 60-cycle a.c. With an adapter, the unit can be operated on 115 volts, direct current.

Vinco Model C-20 Carbide-Tipped Center Punch

Having a tip made of Carboloy cemented carbide, an automatic center punch for glass and hardened steels has been placed on the market by Vinco Products, 326 Bond St., Asbury Park, N. J. Designated as the Model C-20, the tool, it is claimed, may be used in punching up to 1,000 holes in steel of Rockwell C-60 hardness before the point need be removed for sharpening.

The Vinco Model C-20 Center Punch is 4 inches long, weighs 1½ oz., and contains a spring-actuated hammer tripped by pressure on the punch. The unusually small size of the tool enables it to be used in marking hard-to-get-at surfaces. The pressure of the spring may be adjusted to anywhere between 8 and 20 pounds by means of a screw. At the lowest pressure setting, a unique "shock absorber" action permits adjustment of the blow so that glass and light gauge metals can be center punched for subsequent operations without shattering or distorting them.

The punch has an unbreakable plastic handle, scientifically shaped to reduce hand fatigue. The hard carbide point also enables the punch to be used for simple scribing operations on hard steel and glass. The punch point may be removed for sharpening the carbide tip if required. The punch is designed for the ready at-

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Vinco Model C-20 Carbide-Tipped Center Punch in Use

tachment of a wide variety of accessories, including chisel points, nail-set points, hole cutting points, hammer points, and a self-centering attachment for the precision mounting of butt hinges. The accessories are available individually or in

Willson No. 510 Welding Helmet

Identified as the No. 510, a lightweight welding helmet which is said to be especially useful in the welding shops of smaller industrial plants and in independent welding shops has been announced by Willson Products, Inc., Reading, Pa. Features of the helmet include the Willson-Weld lens, a special formula lens which is claimed to exceed the U. S. Federal Specifications for optical quality and protection. Willson-Weld glass is available in 12 different shades to meet the requirements of each particular job. A clear cover glass is provided to protect the welding glass from pitting. Both lenses can be easily removed and insert-

The Willson No. 510 Welding Helmet is made in one piece of tough dense vulcanized fiber, strongly riveted at the overlapping seams for long hard use. When in place for welding, the helmet extends below and under the chin as well as over the ears for protection from flying sparks and hot metal.

Weighing only 19 oz., the helmet is said to be comfortable to wear. Additional comfort features include the adjustable headgear which can be readily fitted to head size by means of an easy-

TCO UNIVERSAL COLLET HEAD

 For precision milling and grinding angles, flats, tapers, hexagons and keyways.

Attachments available for radius and angle wheel dressing and for sharpening milling cutters.

Extra Features --

- Lever Action Collet Closer
- Tail Stock for Accurate Centering

Hardened and precision ground 24 tooth index plate. 90° vertical setting angle. Precision angular type ball bearings with lateral takeup. Takes 5C collets up to 1" capacity. Base 4%" x 7½". Height 6½". Weight 21 lbs.

WRITE for catalog for complete line showing many helpful and time-saving set-ups.

Representatives in your territory will demonstrate without obligation.

MATCO TOOL COMPANY

2830 - 36 WEST CHICAGO 12, Est. 1934 . . . Mfrs. complete line precision vises & wheel dressers



running screw clamp, and a replaceable leather sweatband to absorb perspiration. The helmet is well balanced and can be



Willson No. 510 Welding Helmet

easily swung off the face for quick inspection of work. A strong spring action at the hinge keeps the helmet in raised position when not in use.

Bellows Model DVH-150 Air-Hydraulic Vise

Utilizing flexible controlled air pressure as a clamping force, an air-hydraulic vise designated as the Model DVH-150 has been developed by The Bellows Co.. Dept. MMS, Akron, Ohio. The unit is said to develop a clamping pressure of 150 times the operating air line pressure from any air line pressure up to a maximum of 125 pounds.

The opening of the jaws on the Model DVH-150 is adjustable from a fraction of an inch to a maximum of 5 inches in increments of 1/32 inch through a positive locking adjusting nut on the hydraulic The vise is arranged to operate through the full range of the jaw opening with a jaw power movement of only 1/10 inch, which is said to be ample for clamping most rough castings. In addition to the 6-inch wide hardened steel jaws, the vise is equipped with soft steel false jaws. Power is obtained from a Bellows Model BM-10 air motor in combination with a special built-in hydraulic intensifier unit.

The Bellows Model DVH-150 Air-Hydraulic Vise is available with either a mechanically-operated valve for hand op-



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Bellows Model DCH-150 Air-Hydraulic Vise

eration or for mechanical synchronization to machine movement, or with a Bellows low-voltage solenoid valve for electrical operation. The vise is 30% inches long overall x 9 inches wide x 6% inches high. The 6-inch wide jaws are 1% inches high.

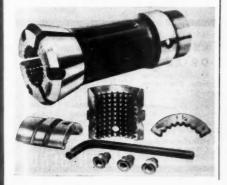
Sheffer Style "SM" Master Collet

A master collet in which pads may be changed without removing the collet from the spindle, designated as the Style "SM," is announced by the Sheffer Collet Co., Traverse City, Mich. The collet pads are said to be positively held in place by means of a standard socket screw that locks in a T-slot in the face of the collet. When the collet is in the open position, sufficient clearance is provided to allow for the insertion of a standard socket screw wrench. The screw need only be backed off sufficiently to drop the shoulder on the pad out of the groove in the collet jaw and it will then slide out of the T-slot, thus permitting the pad to be removed from the spindle nose.

The Sheffer Style SM Master Collet is available for all machines of 1-inch capacity and over. Collet pads are interchangeable among all makes of machines

of equal capacity.

Sheffer Style SM Master Collet



Plastic Floor Patch



Sets Instantly!

> FREE TRIAL OFFER

There's no need to tie up plant traffic while broken concrete floors are being repaired. Durable INSTANT-USE will restore your floors to solid smoothness in a hurry. This new plastic resurfacer is ready for use almost as soon as its' put down. Bonds tight to old concrete, makes long-lasting heavy duty patch. Withstands extreme loads.

TAMP! TRUCK OVER!

Simply shovel INSTANT-USE into the hole or rut—tramp—and your floor is ready for traffic without the usual wait for setting. Keep a drum on hand for emergencies. Immediate shipment.

Mail Coupon for FREE TRIAL OFFER



INSTANT-USE

FLEXROCK Co.

3615 Filbert St., Philadelphia 4, Pa.

Offices in principal cities

Please send me complete information . . . details of TRIAL ORDER PLAN—no obliga-

Company

Address

Dayton Rogers Die-Cut Stamped Name Plate Signs

Under a process originated by the Dayton Rogers Manfacturing Co.. Dept. MMS, 2824 13th Ave., S., Minneapolis 7, Minn., a limited number of die-cut profile custom-made name plates for industrial equipment can be produced. These stamped name plate signs can be made in any size or style. The maximum overall length is 36 inches, with a letter height up to and including 3 inches. The signs are usually made of cold rolled





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Dayton Rogers Die-Cut Stamped Name Plate Sians

strip steel with chrome polish finish or other desired appearance to blend with the equipment on which they are to be used. They can also be made from stainless steel, sheet brass, sheet copper, zinc, and, in some cases, sheet synthetic plastic material.

The bases on many of the name plates can be provided with space for marking model numbers, machine serial numbers, type, and other identification to coincide with the equipment requirements. The signs are usually designed for attachments by means of escutcheon pins, metal drive screws, or similar means of fastening. They can be obtained in a variety of thicknesses ranging from 1/2 to 1/2 inch.



Rigid and accurate. Holds combination center drill and countersink in tailstock or headstock spindle of lathe. Made of steel. Shank precision ground.

SOUTH BEND LATHE WORKS 427A East Madison Street South Bend 22, Indiana

Drill Dio.	Price
13/64"	\$2.50
3/10	2.50
7/16	2.50
13/64	3.25
3/10	3.25
7/16	3.25
	13/64" 3/10 7/16 13/64 3/10

See your dealer - or sent direct postpaid.

SOUTH BEND

New Shop Literature

"Surface" Dew - Point Recorder and Atmosphere Selector are described in a four-page bulletin released by the Surface Combustion Corp., Toledo 1, Ohio. The bulletin discusses the many industrial uses of the dew-point recorder in the heat-treat, chemical, and processing industries, and also how it is used in connection with the transmission of natural gas. In addition, the bulletin explains how the recorder automatically records the dew point of the atmosphere supplied to it and how the atmosphere supplied to it and how the atmosphere services.

lector, which permits multiple atmosphere checking, operates. The bulletin is illustrated with installation photographs, a schematic operational chart, and a graph showing the dew point versus per cent of water vapor by volume. Copy of Bulletin SC-137 free upon request.

"Minute Man" Magnetic Base for height gages and dial indicators, holding work in position on surface plates for layout, supplying magnetic power to rods for chip removal from drilled or tapped holes, holding nozzles of coolant pipes on machine tools, holding special lighting on machine work, collecting steel particles from grinder coolant tanks, retrieving steel parts from plating tanks, and numerous other uses is shown and described in a twocolor folder issued by The du Mont Corp., Dept. MMS, Greenfield, Mass. Copy free upon request.

Baldor Equipment Circulars. The Baldor Electric Co., Dept. MMS, 4351 Duncan Ave., St. Louis 10, Mo., now has available a series of circulars individually illustrating and describing (1) ball bearing grinders, including bench and pedestal grinders, carbide tool grinders, capacitor type grinders, and buffers; (2) relay type capacitor start motors; (3) "Handy" motors for general-purpose use; (4) "Handifast" battery charger and tester; (5) "Handy" battery chargers; and (6) air circulator for factory use. Copies of any or all circulars free upon request.



Hammond Abrasive Belt and Wheel Grinding, Polishing, and Deburring Machinery is the subject of a 20-page threecolor catalog published by Hammond Machinery Builders, Inc., Dept. GP-21, Kalamazoo 54F, Mich. Shown and described are flexible abrasive belt grinder-polishers, abrasive belt grinders, abrasive belt grinder-polisher combinations, polishing and buffing lathes, wheelheads, backstands, tool and general purpose grinders, and other machinery, as well as a wide variety of accessories. Illustrations of many products which can be finished on the machines are included. Copy of Catalog No. 325 free upon request.

Scully - Jones Automatic Recessing Tools. Scully-Jones & Co., 1909 S. Rockwell St., Chicago 18, Ill., has issued a 28-page manual illustrating and describing the company's line of automatic recessing tools for precision recessing, undercutting, grooving, necking, and facing. Included are comprehensive engineering data on eccentric Types "J" and "C" tools, piloted in standard bushings with various interchangeable cutters, and the Type "R" tool for piloting in the work or stopping on the face of the work, with cutters and stop collars interchangeable. The manual also incorporates design features, diagrammatic

explanations of how the recessing tools operate, operating instructions, application suggestions, and production data on the various models, well as a section on the facilities of the company for designing special automatic recessing tools. Copy of Manual No. 17-2 47.

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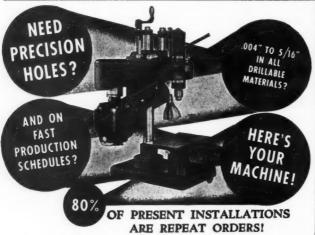
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free upon request.

Campbell Model 223 Bar Cutter designed to cut up to 2-inch diameter solid stock and 31/2inch tubing is the subject of a fourpage catalog re-leased by the An-drew C. Campbell Division, American Chain & Cable Co., Inc., Dept. MMS. Bridgeport 2, Conn. Featured in the catalog are illustrations of the machine, both interior views and close-ups of cutting action. In addition, the catalog contains a breakdown of each part of the machine, specifications, and details. Copy of Catalog DH-30 free upon request.



Precision manufacturers who have "tried out" the Hamilton Varimatic, Super Sensitive, Variable Speed Drilling Machine have found it so efficient in the drilling of small, precision holes on fast production schedules that 80% of our present installations represent repeat orders.

Investigate its many exclusive features. Our Bulletin V-47 gives complete information. Write for it today!



Threadwell Tap and Tool Catalog No. 47. The Threadwell Tap & Die Co., Dept. MMS, Greenfield, Mass., has published a 100-page wire bound catalog which presents illustrated, descriptive, and tabular information on cold-temper taps, carbon and high speed standard hand taps, standard and spiral pointed machine screw taps, three-fluted hand taps, spiral pointed hand taps, serial hand taps, British Association hand taps, nut taps, stove bolt taps, pulley taps, carbon and high speed pipe taps, special taps, adjustable round split dies, spark plug sets, screw plates, die stocks, tap wrenches,

counterbores a nod sets, keyway broaches and sets. arbor presses, high speed twist drills, and so on. In addition, the catalog contains numerous reference tables and an alphabetical index.

Copy of Catalog No. 47 is available to mechanical executives addressing requests on their company let-

terheads.

Binghamton Flexible Shaft Machines. The Binghamton Flexible Shaft Division, Swartz and White Manufacturing Co., 486 Chenango St., Binghamton, N. Y., has prepared a 20page catalog which presents complete information on a line of flexible machines shaft and shaft drives for use in sanding, grinding, drilling, polishing, buffing, reaming, and other opeations. Information on the use and care of flexible shafts is included. as well as tables for use in the proper selection of flexible shaft machines and equipment.

"Grits and Grinds" Vol. 39, No. 5. In this issue of the technical house organ published by the Norton Co., Dept. MMS, Worcester 6, Mass., E. T. Larson presents an article illustrating and describing the new Norflex Cut-Off Wheel for foundry use. In addition, the booklet features an article entitled "Grinding Practice in Non-Ferrous Foundries," as well as a question and answer section on the new Norton Boron Master Alloy for increasing steel hardenability.

Copy of "Grits and Grinds" Vol. 39, No. 5 is available free to interested in-

dividuals upon request.



one of 15 basic Milford rivet setting machines offering unlimited versatility.

exactly the right semitubular or split rivet or coldheaded fastener from Milford's complete line.



1000 MERWIN ROAD MILFORD, CONN.

RIVET & MACHINE CO

1000 WEST RIVER ST. ELYRIA, OHIO

"Magnifying Time," a 12-page booklet describing the use of the Kodak High Speed Camera to analyze motion too fast for study by the unaided eye, is now available free upon request from the Industrial Photographic Division, Eastman Kodak Co., Dept. MMS, Rochester 4, N. Y. Illustrated with enlargements from motion pictures taken at 1,000 to 3,000 frames per second, the booklet provides examples of actual engineering and industrial problems solved by ultra-speed photography. Information is presented concerning the operating characteristics of the camera and of accessories.

"Machining and Repairing Diesel Engines," a 12-page bulletin published by the Giddings and Lewis Machine Tool Co., Dept. MMS, Fond du Lac, Wis., presents case histories of the successful profit-making production of Diesel engine components with the use of horizontal boring, drilling, and milling machines. Photographs taken in the plants of Diesel engine manufacturers provide further clarity to the charts and easily read text. Several advanced machining methods are described to illustrate the application of new tooling ideas to the multiple purpose horizontal boring, drill-

ing, and milling machine. These include methods for milling crankshaft bearing seat bores, boring bearing seats simultaneously, reducing cylinder boring time from 16 to 4 hours, and face milling crankshaft

Prepared as a supplement to the G & L Handbook. "Horizontal Boring, Drilling and Milling Machines and Their Application," the bulletin will be distributed to all Handbook owners and will be sent on requests to other persons.

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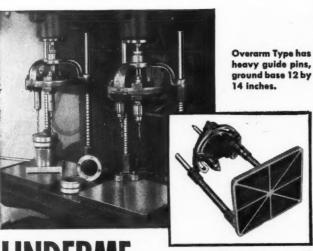
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Garrison Gear Chucks. A fourpage two-color folder describing a method for analyzing the production losses that result from the use of inadequate gear chucks is now being distributed by the Garrison Machine Works, Inc,. Dept. MMS, 515 Bannock St., Dayton 4, Ohio. Included is a description of the facilities of the company for producing pitch line control gear chucks. Copy free upon request.



LINDERME 2-Spindle Head

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This story is typical of the many applications of Linderme 2-spindle drill heads on long and short runs. You'll like these features: drills, taps —in metal, wood, plastics; quick, accurate adjustment, 1/2" to 6" centers; two minute set-up on most drill presses in

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"Grinding with Oil," Revised Edition. A completely revised edition of its catalog and handbook of grinding information, "Grinding with Oil," has been published by the D. A. Stuart Oil Co., 2741½ S. Troy St., Chicago 23, Ill. Revamped to keep the metal-working industry abreast of the rapid changes in grinding oil, the 20-page handbook contains considerable data on the application of Stuart oils to precision grinding projects. Useful sections regarding the selection of proper oils and grinding wheels and wheel marking systems, as well as a chart of standard wheel shapes, are con-

tained in the handhook. In addition, tips for handling grinding wheels are listed for the convenience of the operator. Copy of the handbook is available free to men of the metalworking industries.

"Simplified Practice Recommendation for Vises" is announced by the National Bureau of Standards. Identified as R229-48, Vises (Machinists' and Related Kinds) and effective from May 1, 1948, the recommendation is based on the industry's experience with simplification during the war and covers the following kinds of vises; machinists'; combination pipe, filers', and toolmakers': sheet metal workers'; heavy chipping; steam fitters.

Printed copies of the recommendation may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 10 cents each. Elliott 24-Inch Blade Industrial Fan is the subject of an illustrated and descriptive leaflet now being distributed by the Elliott Manufacturing Co., 350 State St., Binghamton, N. Y. Copy free.

Brown & Sharpe No. 226 Ball Attachment, designed for snapping on or off either the anvil or spindle end of a micrometer caliper, is shown and described in a four-page two-color pocket-size folder issued by the Brown & Sharpe Manufacturing Co., Providence 1, R. I. Copy free upon request.



Flexrock Products. The Flexrock Co., Dept. MMS, Filbert and Cuthbert Sts., Philadelphia 4, Pa., now has available a folder containing illustrated and descriptive information on various waterproofing, flooring, and roofing materials and floor finishes. Copy free upon re-

"Hydro-Drive-The Answer to All Variable Speed Applications" is the title of a four-page two-color folder issued by the Hydro-Drive Company of America, 8827 Miner St., Los Angeles 2, Calif. Information as to the features, operation, dimensions, performance, and so on, of the Hydro-Drive is presented in the folder, copy of which is available free upon

Standard and Special Carbide Tools. The National Tool Salvage Co., Dept. MMS, 5611 Epworth Blvd., Detroit 10. Mich., has issued a four-page two-color catalog which presents illustrated, descriptive, and tabular information, including prices, on a line of carbide tools that comprises core drills, reamers, and

twist drills, both tipped and solid: slotting cutters; hardened steel drills; end mills and face and shell end mills. Copy free upon request.

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Wendt-Sonis Revised Tool Catalog No. 646. A 60-page revised catalog illustrating and describing the company's complete line of standard carbide cutting tools has been prepared by the Wendt-Sonis Co., Dept. MMS, Hannibal, Mo. Specifications are provided to assist in the selection the correct sizes and types of tools. Standard tool order numbers are listed for all tools, which include solid carbide rotary files, grooving tools, adjustable reamers, inserted tooth cutters, and other tools recently added to the company's line.

Copy of Catalog No. 646 Revised is available to mechanical executives addressing requests on their company's letterheads.

KEMPSMITH STANDARD ATTACHMENTS CIRCULAR TABLE Can Be Used on ANY Milling Machine A Kempsmith Circular Table is a precision tool. Handles a large variety of jobs . . . milling circles, segments of circles, large cams and irregular contours. Ideal for gear cutting and high-speed continuous milling. Power feed and indexing attachment optional. KEMPSMITH ARBORS Ask for Bulletin No. 106. in all popular Kempsmith Standard Attachments broaden the sizes or types. Adaptable to ANY make of scope of your milling machine . . . lower capital investment . . . save in set-up time. milling ma-chine with KEMPSMITH MACHINE CO. standardized 1835 SOUTH 71st STREET spindle. MILWAUKEE 14, WIS., U.S.A.

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July, 1948

Saunders Roller Box Tool is the subject of an eight-page two-color illustrated and descriptive folder now available free from the International Trade Relations Agency, Inc., Industrial Division, Dept. MMS, 832 Washington Bldg., Washington 5. D. C.

"Grits and Grinds" Vol. 39, No. 4. An interesting illustrated article entitled "Mankind's Oldest Edge Tool Is Fashioned with Modern Abrasives" provides

the feature material in this issue of "Grits and Grinds," technical house organ published by the Norton Co., Dept. MMS, Worcester 6, Mass. Moreover, the booklet presents another informative article entitled "Mirror Finishing a Chromium Plated Roll."

Copy of "Grits and Grinds" Vol. 39, No. 4 is available free upon request.

"Standard" Tool and Die Accessories. The Standard Machinery Co., Dept. MMS, Providence 7, R. I., has released an eightpage two-color catalog section presenting illustrated, descriptive, and tabular information, including, prices, on various tool and die accessories which comprise socket cap and set screws, stripper bolts, pressure pad stripper and knock-ou t springs, miscellaneous springs, and hardened and ground dowel pins. Copy of Catalog Section D A free upon request.

"Speed-Rght" Flexible Shaft Machine. A four-page two-color bulletin released by The Electro-Mechano Co., Dept. MMS, 261 E. Erie St., Milwaukee 2, Wis., illustrates and describes the "Speed-Right" Flexible Shaft Machine for hand milling and grinding, which, it is claimed, can be instantly set to operate at and maintain, irregardless of load applied, any required speed from 1,000 to 10,000 r.p.m. Various handpieces, miscellaneous equipment, and accessories are also pictured and described. Copy of the bulletin is available free upon request.



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Miniature Fluorescent Lamps. A fourpage folder prepared by Stocker & Yale, Dept. MMS, 48 Birch. St., Marblehead, Mass., illustrates and describes miniature fluorescent miscroscope lamps, general utility lamps, and magnifiers for inspection assembly, and machining operations. Copy free upon request.

Beaver No. 77 Adjustable Threader, made especially for power drive use, is fully illustrated and described in a four-page bulletin issued by Beaver Pipe Tools, Inc., Dept. MMS, Warren, Ohio. Also shown and described are automatic knife pipe cutters and fully adjustable geared threaders. Copy free upon request.

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"Lign-O-Matic," a self-centering turret for drilling machines, is the subject of a 12-page bulletin released by Howe & Fant, Inc., Dept. 11V, 521 Flaxhill Rd., South Norwalk, Conn. Included are a complete explanation of the design features, operating instructions, specifications, and prices. Copy of Bulletin 483 free upon request.

Michigan Powdered Metal Parts. Advantages of the powdered metal process of producing finished parts are outlined in a four-page illustrated bulletin announced by the Michigan Powdered Metal Products Co., Inc., Northville, Mich. The bulletin also illustrates and describes the research and production facilities offered by the company for the contract manufacture of powdered metal parts of all kinds. Copy free upon request.

Genesee Tool Catalog No. 48. The Genesee Manufacturing Co., Inc., Dept. MMS, Rochester, N. Y., has published a 64-page plastic-bound catalog that is divided into four sections, the first of which presents illustrations, descriptions, specifications, and prices of various styles of adjustable hollow mills for cutting steel. The second section presents similar data on various styles of adjustable hollow mills for cutting cast iron and non-ferrous metals. In the third section, illustrations, descriptions, specifications, and prices are presented on facing and counterboring tools. The final section covers special production tools.

Copy of Catalog No. 48 is available free to mechanical executives addressing requests on their company letterheads. Trico Gravity Feed Oiler, a precision lubricating device for solid bearings where an accurate rate of feed and clean filtered oil are essential, is described in a folder prepared by the Trico Fuse Manufacturing Co., Dept. MMS, 2948 N. 5th St., Milwaukee 12, Wis. Copy free upon request.

Shim Application Chart. The Laminated Shim Co., Inc., Dept. MMS, 74 Union St., Glenbrook, Conn., is now issuing a two-color application chart on its "Laminum" Precision Adjustment shims for use in original assembly, field servicing, shop equipment maintenance, repair work, and so on. Copy free upon request.

Baldwin-Southwark Bending Rolls. The Ealdwin Locomotive Works, Advertising Dept., Eddystone, Pa., has issued a 12-page bulletin describing its line of Southwark Bending Rolls, Flanging Presses, Crimping Presses, and Plate Planers. A total of 17 illustrations is contained in the bulletin, copy of which is available by requesting Bulletin 278.

"Versa-Mil," a machine tool accessory for precision milling, drilling, and grinding, is illustrated and described in an eight-page catalog published by the Versa-Mil Co., Dept. MMS, 30 Church St., New York 7, N. Y. The various components comprising the complete unit are individually illustrated and discussed. Several pages of the catalog are devoted to illustrations showing typical applications of the Versa-Mil. Copy free upon request.

U. S. Royalite, Vulcanite and Corvite Grinding and Polishing Wheels. A 28-page simplified price list of resin bonded (Royalite) and rubber bonded (Vulcanite and Corvite) grinding and polishing wheels has been published by the United States Rubber Co., Dept. MMS, Rockefeller Center, New York 20, N. Y. Covered are "a" and special face straight wheels; recessed wheels; flaring cup wheels; curved and straight side cones; plugs; disc wheels; centerless grinding and regulating wheels; polishing strips, and so on. In addition, the price list contains a table giving surface speeds of grinding wheels, as well as a U. S. standard marking sytem chart. Copy free upon request.

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POWER PUNCH PRESSES

Throat Depth — 12", 18" and 24" Capacity — 10 and 20 tons Punches and dies available.

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No. 7 - 71/2 - 8 PUNCHES

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Four Models for

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RANGE 1/2" To 3" RADIUS (MODEL ALSO AVAILABLE FOR CONVEX CUTTING)

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Tool Room Specialties

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Hassall Threaded Blanks. John Hassall, Inc., Dept. MMS, Clay & Oakland Sts., Brooklyn 22, N. Y., has made available a four-page folder illustrating and describing threaded blanks and discussing the facilities that have been set up by the company to handle special orders economically and rapidly in large or small quantities. Copy free upon request.

Allison Rubber Bonded Abrasive Cutting Wheels. A general description together with information on the use, selection, operation, care, and protection of Allison Rubber Bonded Abrasive Cutting Wheels is contained in a 12-page two-color catalog published by The Allison Co., Dept. MMS, 257 Islandbrook Ave., Bridgeport, Conn. Copy free.

"Conveyor Chain by Black" is the title of a four-page two-color circular released by the Black Chain Co., 1400 E. 222nd St., Cleveland 17, Ohio, discussing the facilities of the company for engineering, tooling, and producing conveyor or any special type chain. Illustrations show typical types of chain manufactured by the company. Copy free upon request.



You Should Have this Pocket Catalog-

The MOST COMPLETE LINE of ROTARY FILES (GROBET HAND CUT and GROUND FROM SOLID) for every industrial purpose, in all shapes, diameters, lengths, coarseness of cut, for hard and soft metals, and all other material are illustrated and described in this handy little catalog. Also listed are Diesinkers' Burrs, Tube Deburring Reamers, Countersinks, Burrs, etc.

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The Boice-Crane Metal Sawing Band Saw has 8 speeds . . . one to suit every kind of blade and to efficiently saw every kind of material. Available in bench and floor models. Strong, all-welded vibrationless steel frame.

The Boice-Crane 8-speed multiple purpose band saw is equipped with quick-change gear box and multi-groove pulley drive. An efficient speed is instantly available to the operator for cutting a wide range of industrial materialsiron and steel; brass and copper; aluminum and zinc; brake lining; plastics; building board; fiber and paper; wood and plywood. Also recommended for tool and die work. Our efficient blade butt-welder accessory makes it the equal (up to its capacity) of large die-shop band saws. Cuts up to 1" thick tool steel and softer materials proportionately thicker.

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The gear-shift lever and V-belt are easily accessible for speed changing through a hinged, spring-latch door. Both oil-filler and oil-drain plugs also accessible through door of drive compartment.

The gear-box unit and motor are both housed entirely within the base cabinet and thereby efficiently sealed off from destructive dust and grit.

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Table: 15" x 15½". Tilts 45° right, 10° left. Blades: 3/16" to 34" wide.

Speeds: R.P.M.'s-1120, 890, 660, 450, 70, 50, 35,

Ft. per Min.—4100, 3260, 2420, 1650, 250, 183, 125, 192.

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Fiske No. 231 Die Casting Compound for use in the production of small or large zinc and aluminum die castings is the subject of literature now available free from the Fiske Brothers Refining Co., Dept. MMS, 129 Lockwood St., Newark 5, New Jersey.

"Concretdense," a combination of chemicals in liquid form which is said to increase concrete resistance to disintegrators and abrasion and permit the laying of concrete in freezing weather, is discussed in a four-page illustrated folder prepared by the Flexrock Co., Dept. MMS, Filbert and Cuthbert Sts., Philadelphia 4, Pa. Copy free upon request.

Skyco No-Glare, a light blue translucent material that can be brushed or sprayed on windows and skylights and is designed to eliminate all glare from direct sunlight yet admit 94 per cent of the light and reduce heat 15 per cent, is described in a full-color illustrated folder released by The Skybryte Co., 3125 Perkins Ave., Cleveland 14, Ohio. Copy free upon request.

Cooley Small Electric Heat Treating Furnaces with controlling and accessory equipment are featured in a catalog prepared by the Cooley Electric Manufacturing Corp., Dept. MMS, 38 S. Shelby St., Indianapolis, Ind. Copy is available to mechanical executives addressing requests on their company letterheads.

"High Speed" Automatic Staking Machine expressly designed for staking or riveting fixed or movable joints and said to be equally adapted for such operations as eyeletting, inserting grommets, burring, and pointing with platinum, tungsten, or silver is fully illustrated and described in a four-page two-color circular issued by The High Speed Hammer Co., Inc., Dept. MMS, 313 Norton St., Rochester 5, N. Y. Copy free.

Grieder Tube Cut-Off Machine, which is said to cut any diameter or wall thickness of tubing within its range in less than ½ second per cut, is illustrated and described in a two-color bulletin published by the Grieder Machine Tool & Die Co., Dept. MMS, 324 N. Maple St., Bowling Green, Ohio. Copy free upon request.





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that the readers of MODERN MACHINE SHOP actually study the advertising pages in their search for production ideas. You don't need tricky devices.

A helpful advertisement, simply presented, will get results. RESULTS TELL THE STORY. Gardner Publications, Inc., Cincinnati 2, Ohio.



Wales Sheet Metal Fabricator with Hydra-New-Matic Drive is fully illustrated and described in a 12-page twocolor catalog published by the Wales-Strippit Corp., Dept. MMS, 345 Payne Ave., North Tonawanda, N. Y. Illustrations show the unit being used for punching, nibbling, bending, forming, blanking, and other operations. Standard equipment and specifications of the fabricator are listed in the catalog, copy of which is available free by requesting Catalog 10-A.

Pocket Guide to Airco Eectrodes. The Air Reduction Sales Co., Dept. A19-24P, 60 E. 42nd St., New York 17, N. Y., announces the publication of a pocket guide to Airco arc welding electrodes. The handy, compact guide is said to present complete factors pertaining to the most commonly used Airco electrodes, together with helpful data regarding the factors to be considered when selecting an electrode for a specific job. The profusely illustrated 4 x 8-inch guide is thumb-indexed for ready reference. Section titles include mild steel, high tensile steels, low hydrogen weld metal, stainless steels, surfacing, non-ferrous and cast iron. The

information on each electrode mentioned in the guide includes a description and recommended application and welding procedure data.

Also contained in the guide is an easyto-read electrode selection table which provides the operator complete information on which electrode to use for a particular job, its chemical analysis and mechanical properties. In addition, the guide features a two-page N.E.M.A. standard cloor marking chart and an electrode comparison chart which matches up the various electrodes on the market with their respective A.W.S.-A.S.T.M. classification. Copy free upon request.

E-Z Set Boring Heads. Publication of a bulletin dealing with its line of E-Z Set Boring Heads is announced by The Maxwell Co., 325 Broadway, Bedford, Ohio. The illustrated bulletin provides specifications on the Model No. 30 boring head and Model No. 40 boring-face head. Standard equipment, specifications, and features are charted for easy reference. Capacities of each model, in all sizes, as well as prices, are also presented. Copy of Bulletin No. 3040 free upon request.

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A La Bahn Double Roll Feed Installation

- Easily attached to any press. Completely automatic in operation.
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Standard models from 3" to 12" wide with up to 18" advance in both single and double feed models. Larger feeds and longer advances can be made to your specifications.

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STOCK STRAIGHTENERS . SCRAP CUTTERS

IMMEDIATE DELIVERY

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9" CUTTING FLUTES-12" LONG DRILLS

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9/64"	12	9	1.50	11/32"	12	9	2.25
5/32"	12	9	1.50	23/64"	12	9	2.50
11/64"	12	9	1.50	% "	12	9	2.50
3/16"	12	9	1.50	25/64"	12	9	2.75
13/64"	12	9	1.60	13/32"	12	9	2.75
7/32"	12	9	1.60	27/64"	12	9	3.00
15/64"	12	9	1.75	7/16"	12	9	3.00
1/4"	12	9	1.75			-	
17/64"	12	9	1.85	29/64"	12	9	3.25
9/32"	12	9	1.85	15/32"	12	9	3.25
19/64"	12	9	2.00	31/64"	12	9	3.25
5/16"	12	9	2.00	1/2"	12	9	3.25

HIGH SPEED STEEL, TAPER SHANK

TWIST DRILLS

Extra Length

SIZE INCHES	LENGTH OVERALL INCHES	LENGTH FLUTES INCHES	PRICE EACH NET	SIZE	LENGTH OVERALL INCHES	LENGTH FLUTES INCHES	PRICE EACH NET
17/32"	15	12	\$ 6.50	27/32"	15	12	\$11.50
9/16"	15	12	7.00	7/6"	15	12	12.00
19/32"	15	12	7.50	29/32"	15	12	12.50
% ··	15	12	8.00	15/16"	15	12	13.00
21/32"	15	12	8.00	31/32"	15	12	14.00
11/16"	15	12	8.25	1"	20	15	16.00
23/32"	15	12	8.50	1-1/16"	20	15	17.00
3/4 **	15	12	8.50	1-1/8"	20	15	18.00
25/32"	15	12	9.50	1-3/16"	20	15	20.00
13/16"	15	12	11.00	1-1/4"	20	15	22.00

VICTOR MACHINERY EXCHANGE, INC.

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Chapin Auto-Truer, an automatic truing device which is claimed to provide true concentricity as low as 0.0001 inch in a matter of seconds on chuck or faceplate work, is fully illustrated and described in a four-page two-color bulletin prepared by the Charles E. Chapin Co., Inc., Dept. MMS, East Rutherford, N. J. Copy free upon request.

"Seeing is Believing" is the title of a 16-page pocket-size two-color bookiet published by the Ingersoll-Rand Co., Dept. MMS, 11 Broadway, New York 4, N. Y. which covers the Ingersoll-Rand Electric Rotary Impact Tool, including its use in performing reaming, tapping, nut running, drilling, wire brushing, boring, sawing, screw driving, stud removing, and other operations. Copy free upon request.

Fixture Fittings. Dimensional drawings, tables of sizes, and prices of a wide variety of precision fixture parts and fittings (almost 40 listed) are presented in a six-page bulletin issued by the West Point Manufacturing Co., Dept. MMS, 19635 Merriman Court, Farmington, Mich. Copy of Bulletin P2 free upon request.

"Minute Man" Magnetic Welding Positioner is fully illustrated and described in a two-color folder now being distributed by The du Mont Corp., Dept. MMS, Greenfield, Mass. List price of the positioner complete is given in the folder, copy of which is available free.

Transa Portable Gun Type Saw with stroke adjustment of from 0 to 2 inches for use in sawing metals and other materials of various degrees of hardness and thickness is shown and described in a four-page two-color circular issued by Transa, Inc., Dept. MMS, Suites 440-445, Gateway Bldg., Minneapolis 1, Minn. Copy free upon request.

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"Clean Oil" Vol. 4, No. 1. Published by the Honan-Crane Corp., 682 Wabash Ave., Lebanon, Ind., this issue presents an unusually interesting case history of oil purification and how it solved several major problems for a Canadian plant producing styrene and other chemicals derived from petroleum crude. Also included is a complete description of the construction and features of Honan-Crane Purifiers. Copy free upon request.

Wheelco Flame-otrol Combustion Safeguard. A 12-page two-color bulletin containing illustrations, wiring diagrams, and a complete description of Wheelco Flame-otrol Combustion Safeguard systems has been released by the Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, Ill. Listings of instrument models, together with recommendations for application, as well as of sensing units for gas and oil operation, are contained in the bulletin. Copy of Bulletin Fl-1 free upon request.



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Capacity 3/4" mild steel



FOR TUBE SLOTTING, TUBE SHAPING AND CUTTING FLAT SHEETS BY TEM-PLATE OR TO A SCRIBED LINE.

Manufactured by W. J. SAVAGE COMPANY Knoxville Tennessee

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Gages to A G D Standards. Plug and Ring Gages. Adjustable Limit Snap Gages 0.0 to 24". Pneumatic Hammers. Centerless Lapping Machines. Special Plug, Ring and Snap Gages. Contract Grinding, Lapping, Superfinishing.

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Bender Simplifies Operation ... Results in

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On this job, three accurate bends are made in different planes, meeting close tolerances, without scratching the polished tubes... at a production rate of 2 pieces per minute or 6 bends per minute on a Pines Bending machine. Prior production on other equipment was less than one piece per minute.

Every Pines Bending machine has ample capacity and power to produce a full range of bends and handle heavy-walled stock on SERPENTINE BENDS, STACKED COILS, RETURN BENDS, ROUND COILS, SQUARE and RECTANGULAR TUBES, SPECIAL ROLLED and EXTRUDED SECTIONS and

other bent forms . . . with the accuracy required and without wrinkling.

Write for Pines engineering service to show you how to produce quality bends on a high production basis and at lower costs . . . no obligation, of course.



send for your FREE copy of the new Pines Catalog 106A describing the Pines Principle of Bending and Pines Bending Machines.



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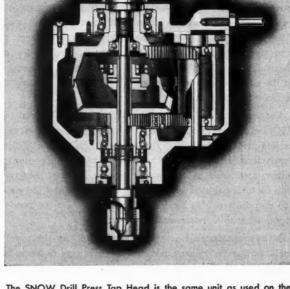
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Over the Editor's Desk

Ignorance Is Not Bliss

DEMOCRACY is the only form of government under which all citizens enjoy the privilege of equal freedom and equal opportunity, and share equally in governing themselves. But where each citizen has a voice in the government, there are bound to be some weaknesses. America's greatest weakness is that many of the American people do not yet understand how our American system of free opportunity and free enterprise works—even though their entire present and future security depend on it. Certain over-smart demagogues, realizing this, are taking advantage of the situation and are capitalizing upon it by promulgating half-truths and untruths in the guise of facts.

For instance, the February 1948 issue of "Economic Outlook," published by the CIO, twists figures around to show that five industries, selected as an example, made profits in 1947 of 16.4%. The writer forgot to add that that was before taxes—and taxes took about two-thirds of this "profit." He also says "corporate profits are either distributed as dividends to stockholders or they are reinvested in the corporation as undistributed surplus. Since World War I the practice of reinvesting much of the corporate profits has been increasing." Do the readers of his publication understand what this "reinvestment" means?

Money reinvested for expansion of plant, for the purchase of new machinery and tools, and so on, means that that much money is being spent to set up equipment to provide more jobs. For instance, the Continental Can Company invests \$7,127 in plant equipment and tools to make a job for one worker. On that basis, jobs for 100 workers require the investment of nearly three-fourths of a million dollars.

These 100 jobs provide wages, the highest known in the history of the world, to provide 100 families with the necessities of life, automobiles, radios, electric refrigerators, and the other modern conveniences which are to be found in the home of every American factory worker. Without that money to reinvest, the Continental Can Company would be unable to provide those 100 jobs. The product of these jobs will produce further profits, a large portion of which will again be invested to provide additional jobs, and so on. Free opportunity to work when and where one will, free opportunity to invest one's savings in American industry and thus create jobs for others—that is the system under which America has grown to be by far the most prosperous nation in the history of the world.

Let us take an example presented in the December 1947 issue of CIO's "Economic Outlook." The editor of that publication presents the figures of Armour & Company, meat packers, showing that Armour makes 1.8¢ profit on each dollar of meat sold. His argument is that the 1.8¢ should be figured as profit against the 15¢ worth of value

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which Armour, by its processing methods, adds in value to the 85¢ which Armour has already had to spend for raw materials. He seems to think that Armour & Company should contribute the 85¢ for nothing. He admits frankly that this profit is made on the labor, machinery, and buildings it uses to process the meat, but complains that the stock raisers, railroads who transport the stock, and others whose services are necessary to the production of the finished product also make a profit on their services. It would be interesting to know just how many of these producers or services he thinks should contribute their materials or services for nothing.

The fact of the matter is that 93¢ out of every dollar received for goods in the American market, on the average, goes to labor for wages and salaries. Iron ore in the ground is worth nothing. It has potential value, because it is expected that someone will dig it out and make use of it. But until it is dug out and used, it still remains valueless.

To the cost of digging 93% worth of raw ore the owner of the mine adds perhaps 7% as rent for the money that he has invested in the mine and the equipment with which the ore is dug. Of every dollar paid for transportation to get that ore from the mine to the steel mills, 93% goes for wages to the handlers, deck hands, coal miners who dug the coal to produce the steam to drive the ship, and other workers. Of every dollar received for the pig iron produced at the smelters, the workers receive 93%. For every dollar's worth of steel made out of the pig iron, the steel workers receive 93%.

Every time a new process is added to the raw material, the workers must be paid their wages—and the people who invested their money in the equipment to perform that processing operation must receive some rent for their money. Without the prospect of such rent for otherwise idle money there would be no investment in plants and equipment and without investment in plants and equipment there would be no jobs. Surely no one would expect a man who had been able to save \$1000 to lend that \$1000 without any prospect of rent for his money. And that rent is what we know as "profit."

Again, our phony economists would have us believe that all of this invested money belongs to a few wealthy families or huge corporations. On the contrary, the stock in such companies as the General Electric Company, Westinghouse Corporation, and similar companies is owned by thousands of people in every walk of life, and the average investment is less than \$1000 per person. Some companies have many more stockholders than workers, but when it is remembered that it may take from \$4000 to \$10,000 to provide a job, that is easily understood.

No man is so blind as he who will not see. These are critical times; it behooves all of us to learn the truth about our country, its institutions, and the economic system which has made this nation great.

Howard Campbug

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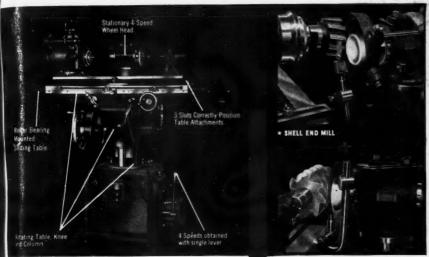
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